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Influences on Physical Activity in Latino Adolescents Over Time

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Influences on Physical Activity in Latino Adolescents Over Time

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2017

Dedication

I dedicate this dissertation to the memory of two women who were very important role models to me: my beloved mother, Alba Julia Balbin Guadalupe, for seeding in my upbringing values that can be summarized in two phrases—"never stop learning" and "do the best you can to help those in need"; and my beloved sister-in-law, Jeanne Johnson Lale, for her inspirational and constant messages of courage and resilience in the face of adversity.

I also dedicate it to my best friends, my husband Sasan Rezaie and my son Andre S. Rezaie, for their undying support through the doctoral program so I could realize my dream of making a positive contribution to society through academic research and teaching.

Acknowledgments

I would like to begin by thanking my dissertation supervisors, Dr. Donna Lynn Rew and Dr. Karen Johnson, for their guidance, time, dedication, and critical feedback on the drafts. Their expertise, understanding, and continued encouragement made it possible for me to work on a topic that was of great interest to me. My heartfelt recognition goes to my chair and academic advisor, Dr. Rew, for allowing me to use her data and for seeing me succeed with my first oral presentation, my first poster and podium presentation, and my first publication.

I would like to extend my admiration and everlasting gratitude to my distinguished dissertation committee members, Dr. Alexandra A. Garcia, Dr. David X. Marquez, and Dr. Kirk L. von Sternberg, for agreeing to be a part of this dissertation journey. I am very grateful to Dr. Garcia, my first advisor, for her mentorship from the start of the doctoral program and for patiently introducing me to SPSS. I am extremely grateful to Dr. Marquez, for his generous fellowship, his time and expertise in physical activity, and his savvy messages of encouragement. I would like to especially acknowledge Dr. von Sternberg, who taught me all I know about analysis of secondary data and structural equational modeling, for his generosity in providing timely, positive feedback and for being a constant source of encouragement.

Thanks to Erika Hale, a statistical consultant for the Division of Statistics and Scientific Computation at the University of Texas at Austin, for her help with computational techniques and feedback of the statistics of my study, her flexibility, and

her quick e-mail responses. I would like to express my gratitude to the Dean and faculty at the School of Nursing for their contributions to my academic training. Special thanks go to Dr. Patricia Carter, who has inspired my academic dedication, interest, and passion in working with students, for her generous mentorship and for hiring me as her teaching assistant. Many thanks go to Dr. Gayle Timmerman for her trust in hiring me as her research assistant in an important pilot study, from which a special fellowship bond was born. Last, but not least, I would like to thank Dr. Jane Champion, one of the warmest colleagues I know, who entrusted me with the orientation and guidance of visiting nurse scholars from universities in Mexico and for generously allowing me to collaborate in their research studies.

It takes a village to educate a mind and complete a doctorate degree. My journey would not have been possible if not for the continued support of my entire family, friends, and former colleagues. Thanks to the physical education teachers I had ever had and thanks to my past and current Zumba instructors, for teaching me that physical activity can be fun and inclusive. Thanks to my husband and son for providing me the time away to work on this project. They will never understand how much of a role they played in my success. Thanks to my brother, Zelmar Tovar; to my sisters, Ana Maria Vasquez, Roxana Tovar, and Carmen Vaccarella; and to my in-laws, Luisa Sibille, Arturo Vasquez, David Baier, and Eric Vacarella, for their understanding when I had to miss important family gatherings, and their loving messages of support. Special thanks to Tess Roach for editing the entire dissertation in a prompt and efficient manner and making sure I adhered to APA consistently throughout the dissertation.

Influences on Physical Activity in Latino Adolescents Over Time

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The University of Texas at Austin, 2017

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Compared to ethnic groups, Latinos are disproportionally at risk for developing chronic diseases that are preventable with adequate physical activity, which has been effective in lowering health risks. Latino youths are the least physically active among adolescents; however, factors influencing their physical activity are understudied. Latent growth structural equation modeling was used for the analyses of cohort-sequential longitudinal secondary data. Tests of invariance indicated that data was equivalent across the cohorts. This study examined moderate physical activity (MPA) and vigorous physical activity (VPA) trajectories in a nonprobability sample of 615 self-reported Latino adolescents aged 14 to 18 using an adapted theoretical framework, Pender's Health Promotion model. It also examined the effects of age; gender; family annual income; parent's marital status; and self-perceptions in physical appearance, body weight, athletic competence, social acceptance, global self-worth, ethnic identity, social connectedness, and parent-adolescent communication on physical activity intercept and slope. The analyses included addressing subsets of incomplete data, and maximum

likelihood methodology was used to decrease bias in the likelihood estimates. Findings revealed two distinctive physical activity trajectories with different influences through middle adolescence in Latino youths. The average MPA was below recommendations and steady without gender differences, whereas the average VPA met national recommendations with gender differences at initial status and declined linearly and steadily in both girls and boys. Almost 6 out of 10 parents reported an annual family income of US$40,000 or less, and 64.5% were married at enrollment. Salient findings indicated that having a family with a higher annual income than others or married parents did not impact physical activity in Latino youths. However, those who showed more athletic competence also had more VPA when they were in grade 9, and those with more parent-adolescent communication or more changes in body weight perceptions had more MPA. Those with the highest scores in social connectedness had less MPA when participants were in grade 9, and those with the largest gains in social connectedness had a lower VPA change rate. Implications of the findings for nursing practice, education policy, and research are discussed.

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Chapter 1: Introduction

Physical activity contributes substantial health benefits to individuals who start early in life (Corbin, Pangrazi, & Welk, 1994), enhancing health protection and reducing disease risk as they grow older (Chodzko-Zajko et al., 2009). However, fewer adolescents than in previous decades are meeting the recommended 60 minutes or more of daily moderate to vigorous aerobic physical activity (United States Department of Health and Human Services [USDHHS], 2008). Engaging in physical activity as early as possible is an important protective health habit. Individuals who are physically active when younger are more likely to be physically active as they become older (Laguna et al., 2013). This dissertation study focused on examining moderate physical activity (MPA) and vigorous physical activity (VPA) trajectories in a sample of exclusively Latino middle adolescents as they moved from grade 9 to grade 12.

Increasing physical activity participation in youths is an important means to preventing early onset of chronic disease and achieving healthy living. Although the benefits of physical activity are more commonly associated with calorie expenditure and weight control, being physically active also promotes other, seemingly unrelated benefits (Piercy et al., 2015). These include gains in academic achievement, relaxation, and improved sleep (Pettee Gabriel, Morrow, & Woolsey, 2012; Shaw, Gomes, Polotskaia, & Jankowska, 2015; Troiano, Pettee Gabriel, Welk, Owen, & Sternfeld, 2012). Meeting physical activity recommendations is aligned with Healthy People 2020, whose specific objectives include increasing the proportion of adolescents who meet the current federal physical activity guidelines for aerobic physical activity (USDHHS, 2016).

Not meeting physical activity recommendations is linked to negative consequences that impact the physical and mental health of adolescents as they grow older (Hallal, Victora,

Azevedo, & Wells, 2006). For instance, youths who are less physically active face the risk of developing, early in life, chronic health conditions such as obesity, metabolic syndrome, and type 2 diabetes (American College of Sports Medicine & American Diabetes Association, 2010; Stocchi, De Feo, & Hood, 2007). Despite obesity and low physical activity being independent health risk factors, having low levels of physical activity and high sedentary behavior greatly increases the likelihood of being obese among adolescents (Kim, Barreira, & Kang, 2016). Obesity in American adolescents has increased in the last two decades (Ogden, Carroll, Kit, & Flegal, 2012), whereas physical activity declined during the same period of time (Dentro et al., 2014; Whitt-Glover et al., 2009).

Neglecting to address low levels of physical activity in Latino youths can be harmful to society considering that the Latino population is rapidly growing, that on average Latinos are much younger than other ethnic groups, and that they are disproportionally more at risk to develop preventable chronic diseases than youths in other ethnic groups (Centers for Disease Control and Prevention [CDC], 2015). If declining physical activity among Latino adolescents goes unaddressed in the approaching decades, there will be a larger number of young Latinos in greater need of health care for conditions related to obesity, type 2 diabetes, and other preventable chronic diseases that will start earlier than ever before. In addition, higher levels of preventable and treatable morbidity affect productivity and add undue stress on already financially limited health care services. Therefore, addressing low levels of physical activity among Latino adolescents is warranted.

Adolescent(s), teen(s), and *youth(s)* are terms that are alternately exchanged throughout this study. Although adolescence comprises a broader age group, in this study these terms refer to participants, males and females, of the same age group, 14 to 18 years old. Similarly, the term

parent(s) in this study refers to the adult who may or may not be biologically related to the adolescent but who nevertheless is in charge of the adolescent's safety and well-being and provides parental care, or companionship, and guidance. In addition, the terms *Latino(s)* and *Hispanic(s)* are used interchangeably in the literature when referring to the Spanish culture or the ethnic origin of an individual or group regardless of race (U.S. Census Bureau [USCB], 2012).

For simplicity, the term selected in this study is *Latino(s)* to indicate the adolescents' self-reported ethnicity or cultural origin and tradition (Logan & Turner, 2013; Phinney, Cantu, & Kurtz, 1997), regardless of their race category: White, African-American, Asian-American, American Indian, or Pacific Islander (Centers for Disease Control and Prevention, 2015). However, it is necessary to clarify that Latinos are ethnically diverse in terms of their national origins and specific traditions. Although ethnically diverse, Latinos who live in the United States share similar Western hemisphere values linked by a common language, Spanish, that unites more than separates them in their interactions and life experiences (Logan & Turner, 2013).

One way to understand disproportionate health outcomes among Latinos (Agency for Health Care Research and Quality, 2015) lies in the fact that, as a group, Latinos have been identified as being less physically active than non-Latino groups; that is, fewer than 2 in 10 Latino adolescents meet the recommended 60 minutes of daily physical activity (CDC, 2014). For this study's purpose, *physical activity* refers to the adolescents' physical movements expressed in terms of frequency, duration, and intensity. A more complete conceptualization of physical activity is addressed later in this chapter.

Knowledge about physical activity in exclusively Latino adolescents is limited. Scholars agree that more research about physical activity in specific population subgroups, such as Latino adolescents, is warranted (Atkin, van Sluijs, Dollman, Taylor, & Stanley, 2016; Ding & Gebel,

2012; Sallis, Prochaska, & Taylor, 2000). Intrapersonal, interpersonal, and environmental factors associated with physical activity have been examined in children and adolescents of general populations (Biddle, Whitehead, O'Donovan, & Nevill, 2005; Ding, Sallis, Kerr, Lee, & Rosenberg, 2011; Sallis et al., 2000; Sterdt, Liersch, & Walter, 2014; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007; Whitt-Glover et al., 2009). The Latino representation in physical activity studies has been too small to reach specific conclusions about their physical activity; and in other instances studies that have used exclusive Latino samples to examine physical activity have not been abundant (Layne et al., 2015; Rusby, Westling, Crowley, & Light, 2014; Wen & Su, 2015).

The extant literature in physical activity shows methodological limitations undermining the evidence. For instance, systematic reviews of physical activity studies on youths show that the most preferred study design has been cross-sectional rather than longitudinal (Sallis et al., 2000; Biddle et al., 2005; Sterdt et al., 2014; Van Der Horst et al., 2007). This distinction is important for a critical appraisal of the evidence. Longitudinal studies comprise findings with temporal sequence and account for temporal order (Ding & Gebel, 2012), whereas cross-sectional studies do not. Other limitations include inconsistencies in methodological quality and disparate findings, which have led to instances of inconclusive evidence that undermines a clear understanding of the declining physical activity in adolescents (Atkin et al., 2016).

Considering what influences youths of general populations to be more active, scholars suggest that health benefits alone may not be enticing enough for adolescents to be physically active (Allender, Cowburn, & Foster, 2006). Other factors have been suggested as more appealing to increase the frequency of physical activity in adolescents than only health gains; for instance, self-perceptions of body shape, weight control, activity enjoyment, and family's and

friends' support in the activity (Allender et al., 2006). However, it is unclear and understudied what appeals or makes Latino teens to be more physically active.

Scholars who have examined adolescents of general populations suggest that parent–adolescent communication is positively associated with physical activity (Ornelas, Perreira, & Ayala, 2007), that social connectedness contributed the largest partial correlation with physical activity in multiethnic youths (Rew, Arheart, Thompson, & Johnson, 2013), and that community connectedness increased the odds of physical activity (Yang, Tan, & Cheng, 2014). However, no evidence of these associations in exclusively Latino youths was found yet. Positive associations between physical activity and physical self-perceptions in subdomains such as physical appearance, physical self-esteem, social acceptance, and athletic competence have been found, albeit only in youths of general populations (Babic et al., 2014; Cağlar, 2009).

Ethnicity is an important attribute in Latinos' development, and it has been linked to socialization and behavioral outcomes (Cağlar, 2009; Phinney et al., 1997; Quintana et al., 2006; Rivas-Drake et al., 2014); however, there is no evidence of its direct influence in physical activity. The basic process of adolescent development includes constant change in intra- and inter-relationships across time and between adolescents and the context in which they grow, although any change is dependent upon the quality of the context and timing (Lerner & Galambos, 1998). No single influence acts alone or is the primary source of change (Lerner & Galambos, 1998). In this particular study, a structural examination of the relationships among variables that were selected a priori assisted in determining the influence that each variable exerts on Latino youths' moderate and vigorous physical activity over time. This study examined whether these relationships hold up when the sample comprised only Latino middle adolescents.

PURPOSE

The overarching purpose of this dissertation was to examine MPA and VPA trajectories in a sample of Latino adolescents, from ages 14 to 18. Specifically, this study sought to determine the effects of age, gender, parent's marital status, family annual income, perceptions of physical appearance, body weight, athletic competence, social acceptance, global self-worth, ethnic identity, social connectedness, and parent–adolescent communication on the intercept and slope of MPA and VPA trajectories.

Adolescence. There is no consensus among experts about a precise definition of adolescence or when adolescence starts and ends. The adolescence concept has evolved throughout time. For instance, the American Academy of Pediatrics has evolved in its position about an age limit for health care, marking the end of the adolescence at age 12 in 1938 and at age 21 in 1972 (Litt, 1998). Research in differing disciplines has contributed to several stances on explaining adolescence. However, experts agree that adolescence is a transition in the life course of an individual that is marked by many concurrent biologically, psychologically, and socially developmental and interacting changes (Bandura, 1989; Bussey & Bandura, 1999; Christie & Viner, 2005; Dasen, 2000; Jaworska & MacQueen, 2015). During adolescence, individuals show increasing capacity to control behavior, read social and emotional cues, and appreciate interpersonal relationships (Yurgelun-Todd, 2007). Many important health habits are learned and formed during adolescence (Manson, Skerrett, Greenland, & VanItallie, 2004; Rey-Lopez, Vicente-Rodríguez, Biosca, & Moreno, 2008). Social-environmental contexts exert influences on either adding or decreasing health risks over a lifetime (Ries, Voorhees, & Gittelsohn, 2010).

Age and school grade have been used as socially and culturally recognized referral parameters of time periods in which behavioral milestones in adolescents' transition paths are

anticipated (Nurmi, 1993). Throughout transition paths, research shows interactions of cognitive development with the social environment that affect children's perceptions of self, other people, and demands for independence (Young, Plotnikoff, Collins, Callister, & Morgan, 2014), thus determining the relevance of age when appraising adolescents' behavior.

However, a definition of adolescence based on only chronological age is not practical enough for some experts. For them, a more functional definition of adolescence is needed (Jaworska & MacQueen, 2015). Adolescence starts with biological changes signaling puberty (girls at age 10 and boys at age 11) and ends when individuals show biopsychosocial readiness for entering adulthood: accepting one's own identity and adult responsibilities (Canadian Paediatric Society, 2003; Christie & Viner, 2005). Accordingly, the World Health Organization (2016) recognizes adolescents as those individuals between the ages of 10 and 19 and identifies three substages: early, middle, and late. This study will focus on middle adolescents, those between the ages of 14 to 18.

Physical activity. *Physical activity* and *exercise* are terms often used interchangeably in the literature. However, these constructs are different, although conceptually related. *Physical activity* refers to body movement that occurs in different life domains (occupational, transportation, leisure or recreational, and housework) with different intensity, duration, and frequency of energy expenditure (Troiano et al., 2012). The physical activity that individuals experience in one domain of life affects the activity in the other domains (Sternfeld, Ainsworth, & Quesenberry Jr., 1999).

Exercise, on the other hand, refers to planned, structured, and repetitive physical activity conducted during leisure time and organized sports (Chodzko-Zajko et al., 2009), and it also entails different intensity, duration, and frequency of energy expenditure (Troiano et al., 2012).

This study will address moderate and vigorous physical activity in youths. Each activity intensity imposes different oxygen demands on the participant's breathing and heart rate frequency (Chodzko-Zajko et al., 2009; Corbin et al., 1994).

BACKGROUND AND SIGNIFICANCE

This study is significant because it (1) examined modifiable factors exerting influence on physical activity in Latino adolescents, a health disparity; (2) was focused on a major gap in the research literature that is related to the prevention of chronic conditions early in life; and (3) used cohort-sequential longitudinal data for the analysis of factors influencing physical activity individually and in a group.

Physical activity and health disparities. Low physical activity is an independent health risk associated with the risks for developing type 2 diabetes mellitus (American College of Sports Medicine & American Diabetes Association, 2010), obesity (Ludwig, 2007; Telford, 2007), cardiovascular disease (Li et al., 2006), metabolic syndrome (De Feo et al., 2007), and higher rates of disability and mortality (Dwyer-Lindgren et al., 2013; Trust for America's Health Reports, 2012).

Latinos disproportionately experience health disparities, particularly those generated by preventable chronic conditions related to physical inactivity. For example, Latinos are twice as likely to be diagnosed with type 2 diabetes mellitus and 60% more likely to die from the consequences of diabetes than non-Latino Whites (National Alliance for Hispanic Health, 2010). The early development of chronic conditions is very costly to health care funds and increases undue expenditures for low-income individuals and families—and society overall. Herman (2013) reported that in 2012 about 22.3 million individuals with diabetes spent $306 billion and $69 billion in direct and indirect diabetes care, respectively, including expenditures in disability,

work loss, and premature mortality. If unchecked, this anticipated growing prevalence in chronic diseases is likely to exhaust limited health care funds and boost undue expenditures for low-income individuals and families.

Therefore, the focus on Latino adolescents is based on evidence that their low level of physical activity is associated with a disproportionate prevalence of early morbidity and mortality from chronic diseases such as obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease (CDC, 2012, 2015). Compared to their peers, Latino adolescents are not biologically different. However, the external contextual factors affecting their psychosocial development and physical activity are unlike those surrounding other American teenagers.

These contextual factors include demographic differences, educational and economic disadvantages (Logan & Turner, 2013), immigration (Martinez, McClure, & Eddy, 2009) and acculturation (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005; Wagner et al., 2008), and culturally driven values such as *familism* (Germán, Gonzales, & Dumka, 2009; Killoren, Wheeler, Updegraff, Rodriguez de Jesus, & McHale, 2015; Santisteban, Coatsworth, Briones, Kurtines, & Szapocznik, 2012) in which the individual's needs are subordinated to the needs of the family.

These contextual factors are among the most salient documented influences on Latino youths' formative years, affecting the development of ethnic identity, self-esteem, autonomy, and relatedness. Exploring the physical self-concept in Latinos, who are brought up under complex sociocultural and economic influences, in association with physical activity outcomes is warranted. Consequently, this study sought to examine relationships that may explain disparities in physical activity generated over time, counteracting limited evidence.

Longitudinal data facilitates the examination of time-related processes that involve change and sequence over time (Polit & Beck, 2012). The analysis of longitudinal data from Latino youths for this dissertation offered a unique opportunity to examine physical activity patterns and changes through middle adolescence in Latino youths, determining factors affecting activity disparities and advancing knowledge about physical activity development in an at-risk population. The findings of this study would contribute to indirectly preventing chronic disease early in life.

Contextual factors and physical activity in Latino adolescents. About 52 million Latinos, predominantly Mexican Americans (64%), live in the United States, representing the most rapidly growing ethnic group in the country (CDC, 2015). Of those, 17.5 million are Latino children (birth through 17 years), with one in three living in poverty and only 73% completing a high school education, compared to 86% of White adolescents (Murphey, Guzman, & Torres, 2014). Latino youths are more likely to live in neighborhoods and attend schools in social environments that are less favorable in resources—money, knowledge, and connections—and mentorship (Campbell, Garcia, Granillo, & Chavez, 2012; U.S. Census Bureau, 2012). Latinos are more likely to grow up and develop in neighborhoods that lack access to recreational resources or offer less safety to children and adolescents (Ding et al., 2011; Logan & Turner, 2013). Studies suggest that teenagers of low socioeconomic groups are more likely than their counterparts to endure structurally social disadvantages that adversely increase the risks to their mental and physical health (Humbert et al., 2006).

National projections estimate that by the year 2050, about one third of the U.S. children ages 1–17 will be Latino (Federal Interagency Forum on Child and Family Statistics, 2014). Compared to other groups, there is significantly less research about Latino children and

adolescents than other Americans (Child Trends Hispanic Institute, 2014). This gap in research about Latino adolescents hinders strategic planning for the prevention of chronic conditions early in life.

Although it is well established that disadvantages in education and income are significantly associated with negative health outcomes and low levels of leisure-time physical activity in ethnic minority groups (Biddle et al., 2005; Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000; Elgar et al., 2015; Wright, 2011), most of what we know about adolescent development has been learned from youths of general populations (Elgar et al., 2015; Jaworska & MacQueen, 2015; Rew, 2005; Steinberg, 2005). It remains unclear the structural effect of multiple sources of psychosocial influence on the physical activity practices of Latino youths, specifically the influence of self-conceptions on the frequency of physical activity.

Adolescent development related to preventing chronic conditions. The literature on adolescent development reflects considerably more evidence about factors associated with risky health behaviors (Cartland & Ruch-Ross, 2006; Rew, Horner, & Brown, 2011; Whitcomb & Merrell, 2012) than what is known about normal adolescent development or factors that promote healthy behaviors in youths, such as physical activity (Fredricks & Simpkins, 2012; Sandlin & Keathley, 2014). According to Steinberg and Morris (2001), it is only in the past three decades that interest in adolescent development has risen and that the focus of attention has shifted from behavioral content to behavioral context. This shift was encouraged by funding priorities toward applied areas of study, risk behaviors, and social problems in particular, and it is reflected in specific topic areas that have dominated the extant literature on adolescent development, such as substance abuse and risky sexual behaviors (Lerner & Galambos, 1998; Lerner et al., 2005; Steinberg & Morris, 2001).

For example, it is well established that some health-risk behaviors (tobacco, marijuana and alcohol abuse) increase with age, that these are more predominant in male than in female teens, and that peers and parents are independent influences (Beal, Ausiello, & Perrin, 2001; Factor, Kawachi, & Williams, 2011; Rew, Horner, & Fouladi, 2010). However, it is unclear whether the same or some characteristics of health-risk behaviors would also apply to behaviors that promote health, such as physical activity. In lieu of a general theory about normative development, our current understanding is highly influenced by the advances on atypical development (Steinberg & Morris, 2001).

Similarly, the literature on physical activity shows imbalances in content and context that limit our understanding about how adolescent development shapes physical activity, particularly in Latino youths. There are 4 salient reviews about physical activity correlates in youths;

however, none of them is exclusively about Latino youths. The oldest and newest reviews were published in 2000 and 2014, respectively. Quality markers will be used to compare them and elicit progress in research. The first review (N = 54) found that 83% of studies used a cross-sectional design, 52% reported results for combined gender, only 7% reported correlates by race and ethnicity, and only a few examined social, behavioral, and psychological variables that were identified as significant (Sallis et al., 2000). A little improvement was reported by the second review (N = 51); although it found that 80% of the studies used a cross-sectional design, 59% reported ethnicity (classified as "white"), 61% had acceptable reliability and validity, but still only a few studies reported psychological variables—perceived competence, body attractiveness, global self-esteem—that have significant associations with physical activity (Biddle et al., 2005).

The third review (N = 84) reported that fewer studies (61%) used a cross-sectional design, yet 20% displayed ethnicity as "Caucasian" with inconclusive findings, less than 10% reported a few psychological variables, and 12% reported social variables with considerable inconsistencies in methodology (Van Der Horst et al., 2007). The fourth and most recent review on physical activity in youths comprised not only correlates but also interventions and health behavior associations that included (N = 9) systematic reviews without meta-analysis and one meta-analysis, representing 316 studies after duplicates were removed (Sterdt et al., 2014). This review confirmed previous reports about quality issues in physical activity research, including eight studies graded as moderate (single quality items were not answered satisfactorily) and only two graded as good (Hanson & Chen, 2007; Lubans, Foster, & Biddle, 2008). Specifically on physical activity in youths, Hanson and Chen (2007) reported that the association between physical activity and socioeconomic status was consistently positive in 29 out the 34 studies that they reviewed.

Ignoring ethnicity (Stein, Fisher, Berkey, & Colditz, 2007), or treating it as a category (Biddle et al., 2005) such as "white versus non-white," is rather oblivious considering it has an important influence on the social construction of the physical self-concept in many youths (Cağlar, 2009; Esnaola Etxaniz, 2008; Hagger, Biddle, & John Wang, 2005). Studies with samples of White and Black youths are more likely available (Kavanaugh, Moore, Hibbett, & Kaczynski, 2015) than studies with Latino youths. The few studies that include multiethnic groups have limited participations of (or no) Latino youths (Garcia et al., 1995; Gillis, 1994; Kahn et al., 2008; Kavanaugh et al., 2015).

In sum, physical activity research that addresses adolescents has been limited by several issues. One important issue is that only a few studies have addressed psychosocial variables, not enough for reviewers to consider the evidence as conclusive. Another important limitation has been the use of heterogeneous variables that are measured with inconsistent results when compared (Edwardson & Gorely, 2010; Maturo & Cunningham, 2013; Sterdt et al., 2014), thus slowing down our understanding about physical activity among Latino adolescents. The findings of this study contribute to the advancement of this important literature, hence making a significant contribution for chronic disease prevention early in life.

The physical self-concept and the social context as related to physical activity. The physical self-concept involves how adolescents see themselves as individuals. This is moderated by gender and arises from multiple sources, including cultural values (Bussey & Bandura, 1999; Cağlar, 2009) and ethnic identity (Hagger et al., 2005). Steinberg and Morris (2001) point out that self-conception includes a global self-worth along with several distinct subdimensions that vary according to specific context. Information about these subdomains has facilitated discerning that teenagers differentiate how they perceive themselves and their abilities according to what they do, with whom they interact, and the places where the interactions take place (Esnaola Etxaniz, 2008). For example, the perceptions of self when conversing with parents at home are different than those when conversing with peers at school. Even then, these self-perceptions may be different whether the topic is math or football.

Self-perceptions are descriptive and evaluative, and they become more differentiated and better organized as adolescents get older, with the content itself being descriptive and evaluative (Steinberg & Morris, 2001). Although studies have linked the physical self-concept with physical activity (Babic et al., 2014), discerning the mechanisms for this relationship in specific subpopulations, such as Latinos, remains difficult. Similarly, studies have brought greater understanding of the role that ethnicity plays as a moderator in the development of youths' feelings of self-worth, self-competence in academics, and risky health behaviors, depending upon the strength and magnitude of their ethnic identity (Rivas-Drake et al., 2014). *Ethnic identity* refers to subjective feelings of attachment to one's own cultural heritage after exploring it, in terms of traditions, values, and beliefs (Schwartz, Zamboanga & Jarvis, 2007).

Parent–adolescent communication during adolescence is an important aspect of adolescent development in that it influences adolescent social behavior and perceptions about the

self and other individuals (Noller & Bagi, 1985). The extant literature shows that as adolescents get older, their interactions with parents decrease while their interactions with peers increase, and scholars suggest that prior socialization experiences, especially social interactions with parents, influence youths' interactions with peers (Steinberg & Morris, 2001). Parent–adolescent communication includes a potential source of influence on Latino youths' physical activity and on how they address perceptions of weight (Berge et al., 2015).

Even more, Steinberg and Morris indicate that peer influence is moderated by the quality of the relationship that youths have with their parents and families. For example, adolescents who live with more caring and cohesive parents will be less influenced by negative peers than they will by their parents. Studies suggest that parent and adolescent communication influence each other (Saphir & Chaffee, 2002). Communication is essentially important for teens as they go through adolescence: youths "who report having a good communication with at least one parent are more likely to report good physical and mental health" (Sacks, Moore, Shaw, & Cooper, 2014, p. 2).

The association of physical activity with social connectedness and parent–adolescent communication is limited to a few studies, with not enough evidence to reach a conclusion. A longitudinal study (N = 13,246; 51% female; 17% Latinos) that examined youths of diverse ethnicity found that parent–child communication was a significant predictor for meeting recommended physical activity guidelines at baseline and 1 year later (Ornelas et al., 2007). Ornelas and colleagues (2007) reported that parent–child communication was calculated as the aggregate of scores of three types of communication that adolescents had with parents or primary caregivers in the previous four weeks in categories such as dating, personal problems, and schoolwork, with scores ranging from 0 = low to 3 = high.

In sum, the extant literature about physical activity in Latino adolescents includes limited evidence to draw sustainable solutions that would increase physical activity in youths and strategically prevent chronic disease early in life. The longitudinal design of this study and the use of the Health Promotion Model facilitated examining physical activity development in Latino youths with a data set of contextual influences.

RESEARCH QUESTIONS

The specific research questions are:

1. What are the effects of gender, family annual income, and parent's marital status on the physical activity trajectories—moderate and vigorous—of Latino adolescents as they move from grade 9 to grade 12?
2. What perception covariates explain change in the moderate and vigorous physical activity trajectories between female and male Latino middle adolescents?
3. What effects do ethnic identity, parent–adolescent communication, and social connectedness have on the moderate and vigorous physical activity trajectories in Latino middle adolescents?
4. Comparing the means, variance, and covariance of moderate and vigorous physical activity trajectories in a developmental model that incorporates them, what are the relationships among these trajectories in Latino middle adolescents? What is the effect of gender in an associative physical activity model in Latino middle adolescents?

HYPOTHESES

The hypotheses to be tested are:

(a) Group means for physical activity decrease throughout middle adolescence for males and females.

(b) Compared with girls, boys have more physical activity throughout middle adolescence.

(c) Adolescents in higher-income families are more active than adolescents in lower-income families.

(d) Adolescents living in households with married parents accumulate more vigorous physical activity than adolescents living in single-parent households throughout middle adolescence.

(e) Change scores of high body weight perceptions significantly predict more vigorous physical activity in males and females.

(f) Higher levels of change in physical appearance and athletic competence perceptions predict higher levels of moderate and vigorous physical activity.

(g) Higher levels of social acceptance and global self-worth exert a positive effect on moderate physical activity throughout middle adolescence.

(h) Higher levels of ethnic identity, social connectedness, and parent–adolescent communication predict higher levels of moderate physical activity in Latino male and female middle adolescents.

CONCEPTUAL MODEL

The conceptual model used in this study to examine factors associated with physical activity was adapted (Figure 1) from Pender's Health Promotion Model (HPM; Pender, 2011). Pender's theoretical framework is based on constructs from social cognitive theory (Bandura, 1989, 2004; Bussey & Bandura, 1999; Pender, 2011; Rew, 2005; Taymoori, Lubans, & Berry, 2010) and has demonstrated usefulness in explaining and in understanding the development of health-promoting behaviors like physical activity. The HPM has been successfully tested in

numerous studies that address the promotion of healthy behaviors (Heydari & Khorashadizadeh, 2014) in both adults (Williams, Wold, Dunkin, Idleman, & Jackson, 2004) and adolescents (Guedes, Moreira, Cavalcante, de Araujo, & Ximenes, 2009; Mohamadian et al., 2011; Srof & Velsor-Friedrich, 2006).

The HPM framework facilitates exploring relationships individually and in groups (Guedes, Moreira, Cavalcante, de Araujo, & Ximenes, 2009; Mohamadian et al., 2011; Srof & Velsor-Friedrich, 2006). The major constructs in Pender's model are grouped in three salient domains: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Mohamadian et al., 2011; Pender, Parsons, & Murdaugh, 2006). Pender and colleagues (2006) describe individual characteristics and experiences as personal characteristics and experiences (biological, psychological, and sociocultural) of an individual that affect his or her subsequent health actions. The bio-psycho-sociocultural factors examined in this study were age, gender, ethnicity, and ethnic identity. These also included parent's marital status and family annual income.

The behavior-specific cognitions and affect construct in the HPM comprises influencing factors on whether or not individuals perform a desired health-promoting behavior (Pender et al., 2006). In this study, the proposed behavior-specific cognitions and affect factors were self-perceptions of physical appearance, athletic competence, social competence, global self-worth, body weight, parent-adolescent communication, and social connectedness. According to Pender and colleagues (2006), the behavior outcome construct is the ending result or health-promotion action generated by the previous factors' influences. In this study, the behavior outcome was physical activity.

The HPM framework is ideal for examining changing relationships of various constructs in adolescents over time. It poses no cultural restrictions, and it lends itself to examining influences on the development of competencies in children, whose bodies, identities, cognitions, and social interactions are, during adolescence, in the process of actively changing to become adults (Srof & Velsor-Friedrich, 2006). Given that "adolescence is a period of increased meaning-making around the complexities of ethnic group membership" (Rivas-Drake et al., 2014, p. 41) and that in disadvantaged social contexts there are increased opportunities to engage in risky behaviors (Masten & Coatsworth, 1998), other salient social constructs (ethnic identity, parent–adolescent communication, and social connectedness) were included in this study as important concepts associated with adaptive behaviors to test their influence in the physical activity models.

The association between ethnic identity and self-esteem has been examined by few studies, and the evidence has not been consistent. Researchers have found positive associations of a composite measure among ethnic exploration, affirmation, and self-esteem behaviors in Latino adolescents (Bracey, Bámaca, & Umaña-Taylor, 2004). In another study, ethnic identity exploration and resolution have been positively associated with a favorable self-esteem and negatively correlated with depressive symptoms among Latino adolescents (Umaña-Taylor & Updegraff, 2007). However, other studies have not found significant associations between ethnic identity and self-esteem or other prosocial behaviors in Hispanic youths (Rivas-Drake et al., 2014).

In sum, Pender's HPM is a social-cognitive framework stipulating relationships among psychological and social factors within a hypothesis that determines a health-promoting behavior (Dewar et al., 2013). The use of this conceptual framework was expected to facilitate answers to

the research questions proposed by this study. It was also expected to aid in a theoretical integration of variables that may be necessary to eliminate redundant observations and avoid overlap (Young et al., 2014). Therefore, by adapting Pender's HPM conceptual framework, this study aimed: (1) to have flexibility for testing the models and the hypotheses; (2) to examine and determine the strength and magnitude of the effects of selected variables on the intercept and slope of MPA and VPA; and (3) to answer the research questions posed in this project addressing Latino adolescents from ninth to twelfth grade.

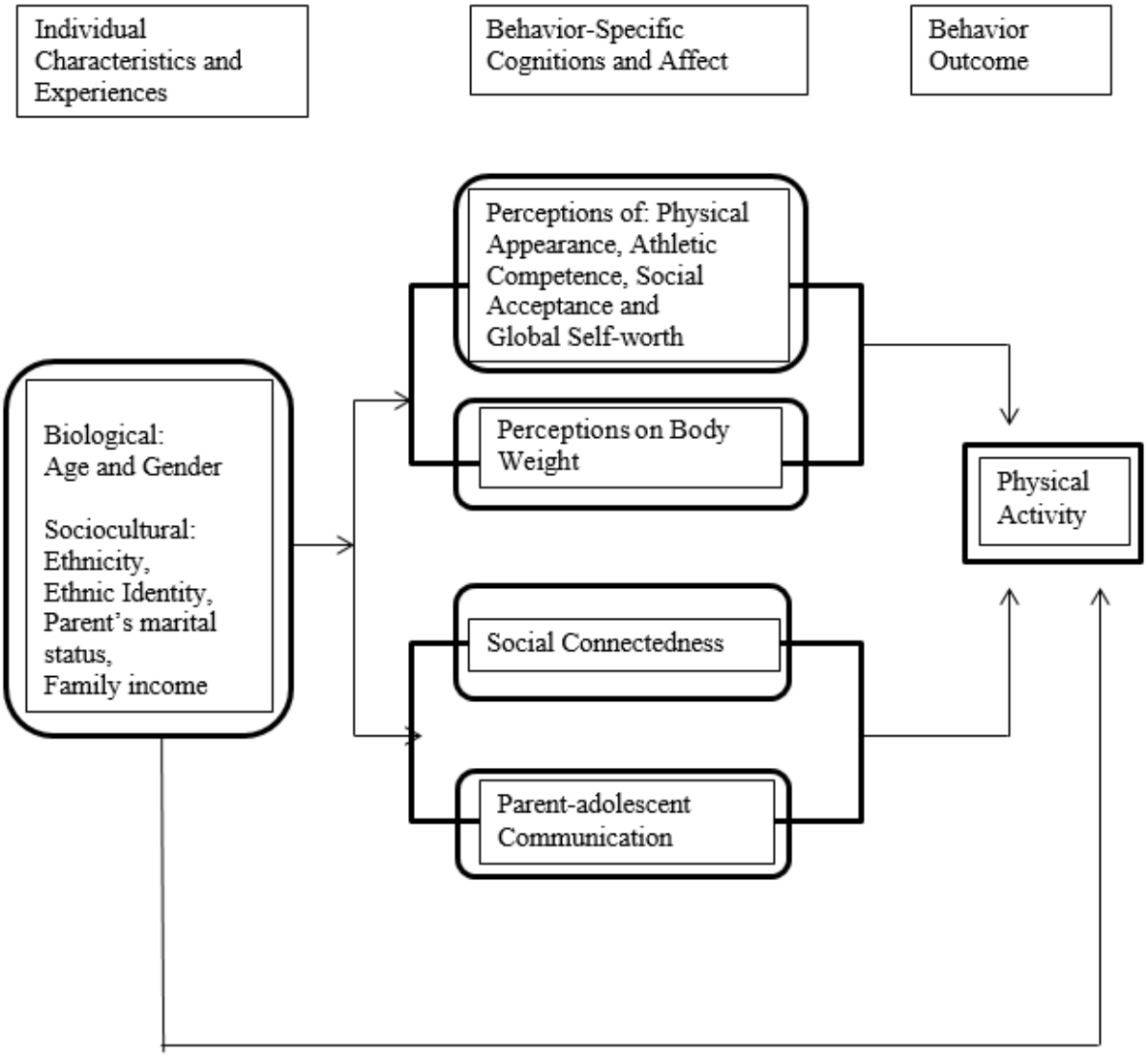

Figure 1. Conceptual framework for factors influencing physical activity development adapted from the Health Promotion Model.

Individual characteristics and experiences. In this study, the biological factors were age and gender; the sociocultural factors were ethnicity, ethnic identity, parent's marital status, and family annual income. Age comprised four categories: (a) 14 to 15, (b) 15 to 16, (c) 16 to 17, and (d) 17 to 18. In addition, gender comprised two categories: 0 = female and 1 = male. Parent's marital data included five categories: (a) married, (b) separated, (c) widowed, (d) divorced, and (e) single; however, for this study, parent's marital status data was recoded as 1= married and 0 = non-married , which comprised data for separated, widowed, divorced, and single. Family income data comprised 12 continuous categories from less than $20,000/year to $150,000/year and over.

Participants were self-identified Latino adolescents. *Ethnic identity* refers to one's subjective feelings of attachment to one's cultural heritage. Ethnic identity was tapped by 14 observations, measured on a range from 1 to 4, with the highest mean score indicating high ethnic identity. Ethnic identity is more salient when Latino adolescents are in a minority rather than in a majority social context (Umaña-Taylor, 2004). The participants attended schools in Central Texas, where approximately 4 in 10 people were self-reported Latinos (U.S. Census Bureau, 2012). This variable was selected because of scant evidence of a significant association between physical activity and ethnicity and between physical activity and ethnic identity (Lee & Im, 2010; Vásquez, Shaw, Gensburg, Okorodudu, & Corsino, 2013).

Behavior-specific cognitions and affect. In this study, behavior-specific cognitions and affect were self-perceptions based upon four subscales of the What I Am Like scale. These subscales were physical appearance, athletic competence, social acceptance, and global self-worth. Each subscale comprises 5 items and a structured alternative format to offset the tendency to give socially desirable responses (Harter, 2012)—for example, "Some teenagers find it hard to

make friends. **But** For other teenagers it's pretty easy." The participant was then given four possible response types and asked to select one answer: (1) really true for me, (2) sort of true for me, (3) sort of true for me, and (4) really true for me, with two of the responses signaling the left of the sentence (before the bolded **But**) and the other two the right of it (Harter, 2012). Each item is rated on a 4-point scale, from 1 to 4, where (1) indicates the lowest perceived competence and (4) the highest level of competence. These variables were selected based on significant evidence from various studies in non-Latino youths (Babic et al., 2014).

Body weight perceptions were selected to examine their association with MPA and VPA based on evidence of a positive association with physical activity in non-Latino youths (Allender et al., 2006; Shin & Nam, 2015) and Latino youths (Berge et al., 2013; Berge et al., 2015; Shi, Tubb, Fingers, Chen, & Caffrey, 2013; Wright, 2011). Body weight perceptions included one observation; this asked participants, "How would you describe your body weight?" The possible answers were on a continuous scale from 1 = very underweight or slightly underweight; 2 = about the right weight; 3 = slightly overweight; and 4 = very overweight.

Social connectedness or the adolescent's feelings that others care about him or her was selected based on limited evidence of its association with physical activity in youths of general populations (Rew et al., 2013; Yang et al., 2014). Social connectedness included 10 observations, with 4 continuous categories from 1 = none; 2 = a little; 3 = some; and 4 = very much. A high mean score indicated highly connected.

Parent–adolescent communication refers to the frequency of information exchange between parents and adolescents in four domains: things to enjoy, job and education plans after high school, teachers or classes in school, and problems or concerns. The answers comprised 4 possible continuous options: 1 = never; 2 = rarely; 3 = often; and 4 = very often. A high mean

score suggested high frequency of communication between the parent and the adolescent. The selection of this variable was also evidence-based (Ornelas et al., 2007).

Behavior outcome. In this study, behavior outcomes were MPA and VPA, with possible answers that were on a continuous scale. MPA referred to physical activity that did not make one sweat or breathe hard, with answer options that went from 0 = 0 days to 7 = 7 days, indicating a specific number of days of 30 minutes of the past 7 days. Similarly, VPA referred to physical activity that makes one sweat or breathe hard, with answer options that went from 0 = 0 days to 7 = 7 days, indicating a specific number of days of 20 minutes of activity over the past 7 days.

ASSUMPTIONS

Based on the extant literature and the conceptual framework, the assumptions for this study included the following:

1. Youths are in the process of change and development marked by puberty, and this process is different for each individual.
2. Youths responded to the survey questions to the best of each individual's abilities and cognitive development.
3. Normative culture values influence the formative years of the self (self-identity, ethnic identity, self-concept, autonomy, and relatedness) and how the self relates or is related to others.
4. Physical activity behavior is influenced by interplay of individual-level attributes as well as by the conditions under which people live; in other words, physical activity is determined by the interplay of self-direction and environmental factors.
5. Youths interact with their environment in an active and dynamic way that includes internalizing and externalizing experiences and behaviors.
6. Youths are in good health and have no motor skill limitations.

7. Ethnic identity is an individual experience that involves a process of exploration before commitment is reached.
8. Parents are a key influence in the development of the autonomy, relatedness, and ego in Latino youths, more than peers or other significant adults.
9. Youths will need parent or adult approval and support for their participation in physical activities that require financial means or transportation.
10. The key factors influencing physical activity structurally are included in the conceptual model.

LIMITATIONS

1. The findings are not generalizable to the overall population of Latino youths living in the United States because of convenience sampling, geographical location, and socioeconomic characteristics of the participants.
2. Study is a secondary analysis of data that were originally collected for a different research purpose.
3. Self-reports may not be accurate measures of moderate and vigorous physical activity of the youths in this sample or of the other variables that were studied.
4. The instruments used to measure physical activity in this analysis reflect lower activity rates than what current physical activity guidelines recommend. These instruments could not be altered since they are part of data previously collected.

SUMMARY

This chapter addressed the background and significance concerning low levels of physical activity in Latino youths. Increasing physical activity among youths is part of the national strategy of Healthy People 2020, to close gaps in preventable chronic disease among disproportionately affected populations. The overarching purpose of this dissertation was to

examine MPA and VPA trajectories in a sample of Latino adolescents from ages 14 to 18. Specifically, this study sought to determine the effects of age, gender, parent's marital status, family annual income, perceptions of physical appearance, body weight, athletic competence, social acceptance, global self-worth, ethnic identity, social connectedness, and parent–adolescent communication on the intercept and slope of MPA and VPA trajectories. Pender's Health Promotion Model was the theoretical framework adapted to examine through model testing in Latino middle adolescents evidence-based factors that have exerted influence on physical activity in youths of general populations. The findings from this study provide important information about modifiable factors that affect the development of physical activity in Latino youths.

Chapter 2: Review of the Literature

In Chapter 2, I open the review of the literature with an overview of adolescence, and salient factors in adolescent development. This is followed by a discussion regarding additional influences on Latino youths' upbringing. Next, I review the extant literature related to the constructs examined in this study. These constructs, starting with physical activity, were identified in the adapted Health Promotion Model (HPM) and include age, gender, ethnicity, ethnic identity, parent's marital status, and family annual income; self-perceptions of physical appearance, athletic competence, body weight, social acceptance, and global self-worth or self-esteem, social connectedness, and parent–adolescent communication.

ADOLESCENCE

Adolescence is a vulnerable time of interrelated and developmental transitions for human beings. Using chronological age has been the most common way to refer to stages of adolescence in studies and discussions (Canadian Paediatric Society, 2003; Rosen, 2004). The literature demarks three adolescence substages, albeit with variations in age range (±1); for example, a source classifies ages 10 to 14 as early adolescence, ages 15 to 17 as middle adolescence, and ages 18 to 25 as late adolescence (Feldman & Elliott, 1990). However, another source considers early adolescence to range from ages 11 to 14 and late adolescence from ages 18 to 21 (American Academy of Pediatrics [AAP], 2015).

Cross-cultural research suggests that cultural groups around the world construct the idea of adolescence in socially different ways from one another, and these varied social constructions on adolescence are influenced by time; evolution; and advances in research, cultural norms, and economic status (Dasen, 2000). For example, in the United States, there is now a greater

understanding about the expertise needed to practice pediatric health care than in past decades. Before 1973, pediatric health care for children ended by age 12 (Litt, 1998).

Around the world and throughout time, there have been low-income communities where child labor has been seen as normative. Before advances were made in science, the reality for many early adolescents from poor families was to start working and acquiring adults' socioeconomic responsibilities sooner than youths from affluent households (Basu, 1999). For some children from low-income families—most likely from ethnic minority backgrounds—who go to work instead of attending school, playing, and developing like their peers (Emerson, Ponczek, & Souza, 2016; Sarkar & Sarkar, 2016), adolescence, as a vulnerable life period of developmental changes, is more likely nonexistent. For low-income families in some cultures, adolescents' behaviors do not manifest as problematic or do not enclose the same meaning and concern as in more affluent societies (Dasen, 2000). Despite advances in child development and improvements in reducing child labor around the world, unlike the United States, child labor is yet seen as being productive and responsible in some cultures (Sarkar & Sarkar, 2016).

Transitions in adolescence have been well documented in the pediatric literature (AAP, 2015). Most of what is known about adolescent development has been obtained from samples of European American youths. I will overview salient findings first, and I will specifically address the evidence unveiled on Latino parents and youths. Transitions are complex, and rapid changes occur in major human dimensions—biological, psychological, and sociocultural—and are affected by the onset of puberty (Özdemir, Utkualp, & Pallos, 2016). Internalizing biological changes is an intrinsic and dynamic factor of influence on teenagers. At the same time, these biological changes are interrelated with self-regulation, self-acceptance, and behavioral developments (Bandura, 1991; World Health Organization, 2016; Yurgelun-Todd, 2007).

Pubertal timing significantly varies among teenagers; for some children, puberty, or physical changes signaling sexual maturity, starts early and for others late (Benoit, Lacourse, & Claes, 2013; Morales-Chicas & Graham, 2015). Genetics; general health; and nutritional, environmental, and socioeconomic factors have been pointed out as significant influences underlying the variability of adolescents' pubertal timing (Rosen, 2004). Late and early pubertal timing have been linked to accentuating issues in the mental health of some adolescents (Benoit et al., 2013).

Psychological changes and the developmental progression of youths' cognition, or the ability to think and understand concrete and abstract thoughts (Christie & Viner, 2005), are notable in adolescence. In optimal development, a youth's evolving thought processes are enhanced by a gradual acquisition of self-regulation, responsibility, and individuation, which are in turn conceived as precursors of autonomous identity, intertwined with emerging beliefs about one's self-competencies (Cole et al., 2001), one's identity development (Koepke & Denissen, 2012), and as in the case of Latino youths, one's ethnic identity (Phinney, 1990). Researchers have found a positive correlation between commitment to identity and psychosocial well-being in adolescents (Luyckx, Teppers, Klimstra, & Rassart, 2014). Furthermore, studies suggest protective mechanisms that interact with contextual adversity to shape resilience in youths' psychological development (Masten & Coatsworth, 1998).

Ego refers to the individual's perceptions, emotions, and attitudes about one's self (self-concept) in multiple domains, including academic contexts and nonacademic spaces (Esnaola Etxaniz, 2008). Youths' development of ego is a critical aspect of psychological development in adolescence because it builds on one's experiences that reflect one's culture and determines how one will relate to self and others (Shavelson, Hubner, & Stanton, 1976). The association of a

positive self-concept and academic performance has been largely studied in adolescents, unveiling a positive relation; that is, a high self-concept is significantly related to high academic performance and vice versa (C. Huang, 2011). The self-concept in nonacademic domains (i.e., physical and social) relationships with physical activity in youths is discussed further in this chapter.

Psychosocial developments largely studied in adolescence have been decision-making and autonomy. It is well established that children depend on parents and other significant adults for basic needs and decision-making processes when they are small (Kagitcibasi, 2005). However, as adolescents' cognition and perceptions evolve, they learn to discriminate ideas about the self and the external world while gradually exercising their own decision-making. Acquiring one's self-governing skills (autonomy) is a basic human need and a critical developmental milestone in adolescents (McNeil & Helwig, 2015).

Kagitcibasi (2005) argues that not only autonomy but also relatedness or degrees of connection with others are basic human needs and that these two are the foundation for the development of the self in different domains (physical, psychological, and social). Rather than conflicting, autonomy and relatedness are compatible, leading to different self-types depending on the societal (individualist versus collectivist) and familial contexts in which youths' self-concepts develop (Kagitcibasi, 2005). Contexts where environmental demands and social-cultural norms intersect are important in understanding adolescents' development as contexts impinge upon youths what is valued and what is not, unveiling a greater understanding of the emergence of different patterns of self in different cultural contexts (Kagitcibasi, 2013).

The point I want to make here is that in individualistic societies, like the United States, youths' autonomy is highly valued as a milestone in child development. However, in

collectivistic groups like most Latinos', cultural values and beliefs strengthen group harmony and interdependence among the individuals without affecting their autonomy (Greif, 1994). Further, in this chapter, salient cultural normative values are discussed.

A large body of research indicates that most psychosocial development is influenced by reciprocal relationships among the growing individual, his or her behavior, and external factors, such as the sociocultural environment in which youths live (Bandura, 1989, 1999; Christie & Viner, 2005; Perez-Brena, Updegraff, & Umaña-Taylor, 2015; Steinberg, 2001). Families, neighborhoods, peers, and schools exert different levels of influence in youths' development in different domains (e.g., academics, athletic competence, physical activity, social competence), including thoughts, perceptions, attitudes, and health behaviors. A recent review found that family and school are among the most studied contexts of the structural system in which children socialize and develop (Rivera, García-Moya, Moreno, & Ramos, 2013). Parents are at the center of the family system, exerting influence on their children through parental practices, parental goals, and parental style. Unless parents are absent, the parental role in children's development includes socializing them (Rew, Arheart, Thompson, & Johnson, 2013; Rivera et al., 2013; Steinberg, 2001; Umaña-Taylor et al., 2014) and influencing their subsequent adjustment to themselves and their environment (Maccoby, 1992).

Power distribution through the use of parental control and harmonious (warm) relationships between parents and adolescents are the underpinning of seminal research about parenting styles and how these styles, in turn, foster or undermine youths' autonomy and instrumental competence (Baumrind, 1978). Four prominent parenting styles have been identified and closely examined: authoritative, authoritarian, permissive, and neglectful (Baumrind, 1978; Lee, Daniels, & Kissinger, 2006). The authoritative style is supported as the

most beneficial for the child's autonomy and development of competences (Merianos, King, Vidourek, & Nabors, 2015; Yomtov, Plunkett, Sands, & Reid, 2015).

In an authoritative parenting style, parents are flexible and responsive to the child's needs, enforce family rules for children, display high levels of discussion, and expectations, and symmetrically distribute power, resulting in low parental control; however, in some cultures, high parental control can be normative; is not always hostile; and does not interfere with youths' achieving independence, social purposiveness, and responsibility (Baumrind, 1978). Specifically, Latinos' parenting style is discussed further down in this chapter.

In European American cultures, authoritative parenting has also been linked to youths' positive emotional development and the ability to monitor one's in relation with other's feelings and emotions, to guide one's thinking and actions (Argyriou, Bakoyannis, & Tantaros, 2016). Only a few researchers have conducted studies that examined parenting style, and in those that have, part of their samples consisted of multiethnic parents and adolescents, including a small sample (10%) of Latinos (Lee et al., 2006). In this study (n = 7,866; 72% White), it was found that children with authoritative parents have a more positive self-concept (ego) and internal locus of control than children whose parents display other parenting styles (Lee et al., 2006).

The literature on adolescence also suggests that examining the influence of parenting styles and parental practices on youths' development has been of high research interest for decades, leading to fruitful investigations. For example, parental practices have been linked to youths' outcomes such as social competence (Altschul, Lee, & Gershoff, 2016; Santisteban, Coatsworth, Briones, Kurtines, & Szapocznik, 2012; Sharp, Caldwell, Graham, & Ridenour, 2006), sexually risky behaviors (Huebner & Howell, 2003; Thoma & Huebner, 2014), substance consumption (Merianos et al., 2015; Mogro-Wilson, 2008; Unger, Ritt-Olson, Wagner, Soto, &

Baezconde-Garbanati, 2009; Wagner et al., 2008), and academic performance (Carranza, You, Chhuon, & Hudley, 2009; Lee et al., 2006; Q. Shi, Steen, & Weiss, 2013). Relevant evidence suggest that the characteristics of authoritative parenting are the most beneficial practice linked to positive youth development (Altschul et al., 2016; Lee et al., 2006; Merianos et al., 2015). Therefore, parents are a key influence on youths' successful adaptations to adulthood.

Studies also show that adolescence and parent-adolescent relationships can be plagued by conflict, stress, and neglect, resulting in greater risks for poor developmental outcomes for youths growing up in these unfavorable contexts (Roche, Ensminger, & Cherlin, 2007; Sunday et al., 2008). The negative emotions generated by poor relationships and poor emotional connections result in adjustment problems for the growing adolescent and are likely to interrupt a process of optimal adjustment (Philippe, Lecours, & Beaulieu-Pelletier, 2009; Rutter, 1987). This literature is out of the scope of this study; however, it is briefly mentioned to underline the focus on poor adolescent outcomes and health-risk behaviors that have dominated the research agenda of adolescent health. Less is known about normal adolescence and health-promoting behaviors (Steinberg & Morris, 2001; Whitcomb & Merrell, 2012).

Adolescence and Latino youths. A healthy psychosocial adaptation throughout Latino youths' adolescence would positively affect current and future health as adults. However, compared to peers, Latino youths are more likely to face additional layers of complex influences that would variedly affect important aspects in their development. These are posed by the socioeconomically disadvantaged status (Federal Interagency Forum on Child and Family Statistics, 2016; Logan & Turner, 2013; Parke et al., 2004); cultural Latino normative values (Killoren, Updegraff, & Christopher, 2011; LeCuyer & Zhang, 2015; Mogro-Wilson, 2008), which in turn impact youths' socialization and psychosocial development (Killoren, Wheeler,

Updegraff, Rodriguez de Jesus, & McHale, 2015; B. Lee, Scholar, & Porfeli, 2015; Steinberg, 2001; Wheeler, Updegraff, & Crouter, 2015); and autonomy and relatedness (Kagitcibasi, 2005, 2013). Various aspects of the self (ethnic identity, self-esteem, autonomy, and relatedness) have been found protected by salient normative values of the Latino culture (Perez-Brena et al., 2015; Umaña-Taylor & Updegraff, 2007).

In the developmental literature, the influencing role of acculturation on immigrant Latino youths is acknowledged. Acculturation is described as a bidimensional process, in which an individual can retain and acquire one's heritage culture and also adopt values, beliefs, and behavioral practices that are normative in the receiving cultural context (Lorenzo-Blanco et al., 2016). Acculturation exerts influence on youths' well-being (Lorenzo-Blanco et al., 2016). For example, language-brokering situations, in which a bilingual child assists monolingual parents in social transactions and communication, interrupting and undermining the optimal parent-youth relationship that should foster independence (Martinez, McClure, & Eddy, 2009).

Moreover, youths' acculturation to the US culture and the pressure to fit in with peers is linked to an increase in the risk of unhealthy behaviors (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005; Wagner et al., 2008). Even more, the acculturation gap is linked to impairing communication flow and causing emotional distance between parents and children (Marsiglia, Nagoshi, Parsai, Booth, & Castro, 2014; Wagner et al., 2008); and last, conflicting cultural differences between adolescents and their parents have also been linked to increasing risks for youths' substance abuse (Schwartz, Zamboanga, & Jarvis, 2007; Unger et al., 2009). However, the negative effects these factors may exert on youths' psychosocial adjustment are greatly counteracted by the endorsement of salient cultural values, such as the value that Latinos place on family ties, family loyalty, and family relations (Davidson, Updegraff, & McHale, 2011).

Little is known about normative family relationships in youths, particularly Latino adolescents over time (Killoren et al., 2015; Umaña-Taylor, 2009); however, most of what is known about the relationships within Latino families is inferred from studies that have examined Latino adolescent health and academic risk behaviors. For example, a common Latino parenting style is the concurrent use of parental control and parental warmth, and it was found to be health-protective against alcohol use (Mogro-Wilson, 2008). According to Mogro-Wilson (2008), parental warmth was significantly linked to a positive parent-youth relationship, which, in turn, was negatively related to youth's alcohol consumption. Parental control was also negatively linked to alcohol use; and the study determined that parental control was associated with the language spoken at home. If English was spoken at home, parental control decreased (Mogro-Wilson, 2008).

Perceptions of high psychological parental control in Latino youths are likely to undermine their self-efficacy and self-esteem in the absence of parental acceptance and support. A path analysis in one study showed that the relationship between high psychological control and poor self-esteem and poor self-efficacy became insignificant in Latino youths when they perceived parental support and emotional acceptance (Yomtov et al., 2015). In another study in Latino youths, mothers' and fathers' warmth significantly supported bidirectional associations between parent-adolescent and adolescent-friend relationships across the developmental trajectory (Rodríguez, Perez-Brena, Updegraff, & Umaña-Taylor, 2014). Specific to girls, this study found that mother-adolescent immigrant status moderated maternal warmth in early adolescence and friendship intimacy with the same gender in late adolescence, thus explaining close relationships among adult Latinas (Rodríguez et al., 2014).

Qualitative research on Latino parenting suggests that mothers' perceptions on caring for their teenage children in hostile environments are affected by the intersection of race/ethnicity, class, and gender (Elliott & Aseltine, 2013). A hostile environment could be a school where rules or normative practices accentuate a cultural superiority of a group over individuals who are in the minority, which may happen through subtle social interactions or discriminatory rules affecting specific individuals. To keep their children safe, Latino mothers employ high levels of control by encouraging individual responsibility through discussions about the consequences of good and bad choices; closely monitoring youths' friendships, activities, and whereabouts; and keeping youths busy in positive organized activities (Elliott & Aseltine, 2013).

Researchers agree that despite economic disadvantages associated with their ethnic minority status, Latino families display strong characteristics that protect children's psychosocial development (Germán, Gonzales, & Dumka, 2009; Killoren et al., 2015). For example, *familism* is a significant ideology exhibited by most Latino families. In this practice, Latinos set as a priority the family relationships rather than the needs of one individual, and it is through familism that parents place a high value on well-mannered, prosocial children who are respectful of authorities (Germán, Gonzales, & Dumka, 2009; Killoren et al., 2015). Another salient characteristic of Latino families is the importance placed on gender roles, which in turn shapes family relationships, roles, and responsibilities (Killoren et al., 2015). The role of mothers as agents of primary socialization for the children (Bussey & Bandura, 1999) assigns Latino women the gendered role of keepers of cultural values that will pass through generations as they organize their families' environments to reflect those values (Germán et al., 2009).

Latino American families tend to be more oriented toward family relationships than other ethnic groups, and the adolescents in these families are active participants in a larger social world

that extends far beyond their families. However, on occasions, these other interpersonal relationships counterbalance lack of emotional stability or relationships that are filled with low parental acceptance and conflict at home (Davidson et al., 2011).

Parental and non-parental relationships have been explored in studies in an effort to determine their effect on children's development. The study (N = 14,736, 17% Hispanic) conducted by Crosnoe and Elder (2004) determined that teens' perceptions of emotional distance (disconnect) from parents is a significant risk factor that exceeds the effects of family background, race/ethnicity, and academic attitudes. In academic activities, non-parental relationships can influence youths in positive and negative ways, but non-parental relationships do not protect against the risk of parent-youth emotional distance in Latinos (Crosnoe & Elder, 2004). Therefore, having a firm foundation of instrumental and emotional support at home is a protective factor of influence for healthy psychosocial development in Latino youths.

Gaps identified. In this review, I highlighted important milestones in the research literature that has contributed to our understanding of adolescent development. Developmental scholars in different disciplines, including cross-cultural research, have shed light on complex interrelations and intersections between youths' rapid development and external sociocultural influences occurring throughout their formative years. In looking forward to analyzing Latino youths' declining physical activity, I consider it essential to not only explore the plausible mechanism of shaping behaviors but also to acknowledge that developing low levels of physical activity in adolescence is linked to preventable mortalities and morbidities in adulthood (Hallal, Victora, Azevedo, & Wells, 2006).

In this review, I found a predominance of literature that has examined, explained, and aimed to decrease problematic behaviors in youths. In previous decades, researchers have

achieved successful advances in preventing and treating health-risk behaviors; however, attempts to develop a general theory of normal adolescent development or normative development in specific ethnic youths are yet to succeed (Steinberg & Morris, 2001; Umaña-Taylor, 2009). Research on normal development, or even more, healthy adaptations throughout health-promoting factors is scant (American Academy of Pediatrics: Council on Communications, 2013; Steinberg & Morris, 2001; Whitcomb & Merrell, 2012).

Therefore, the extant literature about Latino adolescent development shows large gaps in research. Our knowledge about parents and adolescents in this community is based on evidence generated by studies that investigated health-risk behaviors such as substance abuse and sexual risk. From these studies, we have learned that parenting style and contextual factors in the environment may present risks or protection to the quality of Latino youths' development and health behavior; and as such, these factors are modifiable with strategic interventions. Depending on gender, sociocultural makeup, and environmental contexts, the nature of the influence on Latino youths' development and health behavior varies (Bussey & Bandura, 1999). Health-promoting mechanisms in adolescence that contribute to future health gains in adulthood need to be examined and targeted for intervention.

PHYSICAL ACTIVITY IN YOUTHS

Physical activity scholars suggest that youths' physical activity is a quadratic function of age, increasing until early adolescence and declining after age 13 in boys and girls (Kahn et al., 2008). In studies with samples of Latino youths, Eakin, Villarruel, John, and Jemmott (2005) found that past physical activity predicts future physical activity. In other studies, scholars have also pointed out that physical activity in adolescence and adulthood are positively associated

(Laguna et al., 2013) and that different mechanisms through which physical activity during adolescence may influence adult health are clear (Hallal et al., 2006).

A longitudinal study showed that physical activity at baseline in boys and girls was associated with age, body mass index, psychosocial variables, personal attitudes about body shape, perceived peer attitudes about body shape/fitness, parental attitudes about physical activity, parental physical activity, and environmental barriers to physical activity; however, age was the only variable that predicted change in physical activity over time (Kahn et al., 2008). In addition, studies found significant time effects on group mean change with small increases in youths' body mass indices, moderate decreases in physical activity, and very small changes in physical self-perceptions (Crocker, McDonough, Kowalski, Kowalski, & Sabiston, 2006).

A review of quantitative studies that comprised youths aged 3–18 showed that the most consistent associations were objectively measured environmental attributes (e.g., walkability, crime, parks, and street connectivity) with reported physical activity; and the most supported correlates for adolescents were land-use mix and residential density (Ding, Sallis, Kerr, Lee, & Rosenberg, 2011).

Studies also suggest that youths' physical activity is patterned by gender, income, education, and ethnicity (Atkin, van Sluijs, Dollman, Taylor, & Stanley, 2016). However, some findings remain inconsistent because observed methodological inconsistencies among studies fall short of meeting basic quality criteria (Sisson & Katzmarzyk, 2008; Sterdt, Liersch, & Walter, 2014; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Scholars have recommended models that include both intra-individual (e.g., attitudes, beliefs, personal attributes) and extra-individual (e.g., environmental context, economic policies) influences that may impact individual physical activity (Humbert et al., 2008; Spence & Lee, 2003); that improve measurement methods,

including contextualizing youths' physical activity by domains (e.g., recreational, transport); and that focus on specific groups (e.g., disabled, low income, rural) (Atkin et al., 2016).

In sum, the extant literature focusing exclusively on physical activity in youths is ample; mostly derived from cross-sectional surveys; based on self-reporting methods; and focused on general populations of American, European, and Australian youths (Atkin et al., 2016). Physical activity has also been examined as a part of several health-promoting behaviors. The literature supports that health behaviors, positive or negative, should be addressed as groups of behaviors rather than individual behaviors (Steinberg & Morris, 2001) as they are likely to correlate in the same health direction. For example, a study in Texas that included 3,708 (19% Hispanic) early adolescents found that physical activity and healthy meal intake were significantly associated with reduced academic and behavioral problems at school (X. Shi, Tubb, Fingers, Chen, & Caffrey, 2013).

Factors Associated with Physical Activity and Latino Youths

Understanding the contextual influences on physical activity in growing Latino adolescents is critical to developing effective interventions. These include intrapersonal characteristics, sociocultural factors, and environmental aspects, which vary throughout the progression of life. However, our understanding of physical activity's influences in Latino youths has been limited due to Latinos' small representation or the limited number of available studies focused exclusively on Latinos (Corder, Ekelund, Steele, Wareham, & Brage, 2008; Eakin et al., 2005).

Learning about the physical activity of Latino youths has also been limited from generalizations by the specific purposes of the different studies. A few examples of these varied purposes in studies include Emken et al. (2012), which sampled overweight Latino middle

adolescents to examine their physical activity through the use of wireless technology and found that running was the most accurately detected activity in this group (96%). Leek et al. (2011) sampled 103 early adolescents (77% Latinos) who played soccer and 97 (67% Latinos) who played softball to examine their physical activity during organized sport activity and found significant age and gender differences; that is, males and younger teenagers were more physically active than females and older youths in moderate to vigorous physical activity.

In addition, Latino youths who play soccer spend 17 more minutes in moderate to vigorous physical activity and 16% more practice time than baseball players (Leek et al., 2011). Finally, Kantor, Grimes, and Limbers (2015) sampled rural, early Latino adolescents to examine the associations among physical activity, sedentary behaviors, and overall health-related quality of life and found that Latino youths who participate in a greater number of sports teams had better physical and social functioning than those who spend more time watching television. These studies suggest that Latino youths are more active in group activities than in isolated physical activities.

Physical activity studies that sampled Latino youths have also selected a wide range of variables to examine, which imposes constraints on reaching generalizations about physical activity in Latino youths. For example, Eakin et al. (2005) examined age, attitude, acculturation, and past physical activity and found that these variables predicted physical activity intentions in male youths; only attitude and past physical activity predicted physical activity intentions in girls. Wiley, Flood, Andrade, Aradillas, and Cerda (2011) examined perceived parental influence on physical activity in 3,908 middle and late Mexican adolescents and found that perceived parental physical activity, enjoyment of physical activity, and conflicts about physical activity were significant positive predictors of adolescents' physical activity.

Age, gender, and physical activity. Physical activity associations with age and gender variables have also been examined in the adolescent literature in several reviews. The conclusions were not consistent and were based on findings derived from the general youth population. For example, age was reported as negatively associated with physical activity in youths in about 70% of the 27 studies reporting this association in the review conducted by Sallis, Prochaska, and Taylor (2000). The negative association between age and physical activity was supported in 64% of 11 studies reported in another review (Biddle, Whitehead, O'Donovan, & Nevill, 2005).

No significant associations were found between age and physical activity in the review (N = 40) conducted by Van Der Horst et al. (2007). The last available review about physical activity correlates was conducted by Sterdt et al. (2014) and comprises the years from 2000 to 2009. In this systematic review of reviews, Sterdt and colleagues (2014) found that two out of three systematic reviews that examined the variable age supported a significant negative association between age and physical activity in youths.

Regarding physical activity and gender, evidence of an association was extracted from several reviews that included studies in general populations. For instance, a review (N = 54) of studies published between 1970 and 1998 reported constraints in finding information about gender as only half of the studies addressed this variable; that is, of 28 studies, only 52% reported combined genders, 43% reported associations separately by sex, and 6% had female-only samples (Sallis et al., 2000). Despite these observed limitations, Sallis and colleagues (2000) concluded that male youths were more physically active than female youths. Since 1999, reviews have consistently found support for this finding: girls are less active than boys (Biddle et al., 2005; Sterdt et al., 2014; Van Der Horst et al., 2007). Recently, a longitudinal study with

Finnish middle adolescents reported specific findings regarding the association between physical activity and gender. Timo, Sami, Anthony, and Jarmo (2016) found that gender was only statistically significant for vigorous physical activity; that is, boys had more vigorous physical activity than girls.

Specific findings on physical activity correlates extracted from reviews suggest no explanations for the limited number of physical activity studies in Latinos. No explanations for lower and declining physical activity in Latina girls have been given either. Possible explanations for these findings may be old reporting practices that did not consider it necessary to report gender and ethnicity (Sallis et al., 2000), studies were not planned with an ethnic homogeneous design (Atkin et al., 2016), or studies had a limited recruitment of Latino participants (Neumark-Sztainer, Story, Hanna, Tharp, & Rex, 2003), whereas in others, Latino youths were not even included (Garcia et al., 1995; Gillis, 1994).

Ethnicity, ethnic identity, and physical activity. According to one review, only 7% of the physical activity studies (N = 54) published between 1970 and 1998 reported physical activity correlates separately by race or ethnicity, 9% did not report either, and 57% had samples of only one racial group (Sallis et al., 2000). After 1999, ethnicity classified as "white" was associated with higher levels of physical activity for girls, but the effects were mainly small (Biddle et al., 2005). In 2007, another review found no significant associations between ethnicity and physical activity (Van Der Horst et al., 2007). Two systematic reviews reported that non-Latino whites were more active than other ethnic groups (Sterdt et al., 2014). Therefore, no conclusions can be reached. The physical activity association with ethnicity in youths requires further research.

Ethnicity is a social construct that can be confused with socioeconomic status, cultural values, and socialization (Kenny & McEachern, 2009). Specifically, *ethnicity* refers to a social status of differentiation for a group in which the members identify with one another based on common cultural traditions, language, and nationality (Dressler, Oths, & Gravlee, 2005). As a potential physical activity correlate, ethnicity is understudied in populations in general and should be examined considering the benefits that ethnicity brings to Latino youths' relatedness and to group belonging needs.

Ethnic identity is an aspect of youths' global identity and refers to the state in which youths perceive their personal attributes and values as similar to those of their referral group, regardless of the conditions of the environmental context, whether a youth is part of the social majority or minority (Umaña-Taylor, 2004). Developing an ethnic identity is a process that requires time for exploration, in which an individual gains knowledge and an understanding of

the referral ethnic group and is likely to develop a sense of affirmation and belonging (Phinney, 1992).

The feelings attached to ethnic membership are an important aspect of one's self-concept. Phinney (1990) considers the rapid changes of adolescent development to bestow greater abilities in cognition, including an increased concern with physical appearance, which facilitates the ability for adolescents to excogitate their ethnic identities. Studies have linked the positive association of ethnic identity and self-esteem; however, Phinney (1992) found that only in adolescents for whom ethnicity is obvious will the positive association between ethnic identity and self-esteem hold.

Strong ethnic identity confers emotional resilience for youth even in the presence of status-unrelated stress (Williams, Aiyer, Durkee, & Tolan, 2014); nonnative teens possess developmental advantages related to their immigrant status that cannot be explained by cultural characteristics alone but that provide them with psychological protection from the effects of social discrimination (Chun & Mobley, 2014; Quintana et al., 2006). Therefore, it is important to examine physical activity's association with ethnic identity, as this relationship can unveil important aspects of well-being in Latino youths for whom ethnicity is relevant.

Parent's marital status, family income, and physical activity. In a review of studies published before 1998, Sallis et al. (2000) found that socioeconomic status was unrelated to youths' physical activity in general populations. However, a review (N = 51) by Biddle et al. (2005) reported that family income specifically was a significant correlate with girls' physical activity. Another systematic review of reviews (N = 10), with only one meta-analysis, showed that youths' physical activity is associated with socioeconomic status (Sterdt et al., 2014). Therefore, socioeconomic status (family income) is considered a stable physical activity correlate in youths of general populations.

It is unclear if parent's marital status is associated with physical activity in youths. A recent study that examined the association between marital status and psychological distress among Latinos in the United States, focusing on the impact that being married may exert upon family functioning (e.g., support, cohesion, communication), found that compared with other statuses, being married was associated with lower levels of psychological distress in women (Darghouth, Brody, & Alegria, 2015). Considering that Latino women hold a prominent role in their families, and in children's development, socialization, and health behaviors, it is important to test the effects of parent's marital status on MPA and VPA. It is also possible that youths living with a non-married parent must be more physically active to help that parent with household care. Parent's marital status was included in this study's models as a factor of possible influence on physical activity in youths.

Economic adversity harms the cognitive, behavioral, emotional, and physical development of children and youths (Conger et al., 2002). Even more, economic adversity affects parent's emotions and behaviors, who in turn exert pressure on the parent-adolescent relationship through disrupting communication and parenting practices that negatively impact

children's psychosocial adjustment as adolescents grow (Conger et al., 2002). Therefore, I hypothesized that there is a positive association between socioeconomic status (parent's marital status and family income) and physical activity in Latino youths and that this association may explain current physical activity rates.

Physical self-concept and physical activity. *Self-concept* comprises clearly organized, hierarchical, and differentiated multiple domains; in addition, the self-concept can be descriptive or evaluative as in self-esteem (Esnaola Etxaniz, 2008). In this section, I discuss the physical and social self-concept, and I overview basic information about the self-concept—specifically, the physical domain of the self-concept—to discern a vast array of terms found in the literature for similar constructs. This review should facilitate presenting extant associations between the physical self-concept and physical activity in youths.

One's self-concept is built through two sources of information: "direct appraisals of 'what we are like'" and "reflected appraisals that result from one's beliefs about how one is seen by others" (Sebastian, Burnett, & Blakemore, 2008, p. 441). According to Shavelson and colleagues (1976), the self-concept exhibits certain characteristics: it is hierarchical; one's self-perceptions in specific situations are at the base of the hierarchy; one's self-perceptions in the physical, social, and emotional domains are in the middle; and the general self-concept is at the top of the construct's organization.

As an individual ages, the multidimensionality of the self-perceptions increases and the stability of the self-concept decreases as the self-perception becomes more specific and situation-dependent in the hierarchy (Esnaola Etxaniz, 2008; Shavelson et al., 1976). The outcomes included in the physical self-concept or physical self-perceptions are not consistent; some scholars have proposed measuring various outcomes of the physical self-concept. For example,

the instrument developed by Harter (2012) consists of 9 subscales measuring 9 subdomains, but only two of them tap the outcomes of physical self-perceptions (or physical self-concept). These are the Physical Appearance (or feelings about how one looks) and Athletic Competence (or one's ability to do well at sports) subscales (Harter, 2012). The other subscales in Harter's instrument measure other nonphysical subdomains of the self-concept: scholastic, job competence, romantic appeal, behavioral conduct, close friendships, social acceptance, and global self-worth.

Other researchers have been able to validate 4 outcomes of the physical self-concept—*body attractiveness*, *sports competence*, *physical strength*, and *physical condition* (Fox & Corbin, 1989); and others have yet validated 5 outcomes in the physical self-concept—*sports competence*, *physical self-worth*, *physical condition*, *physical strength*, and *body attractiveness* (Sonstroem, Speliotis, & Fava, 1992). Some scholars have included in the physical self-concept additional outcomes such as *weight perceptions*, *health*, *obesity*, and *flexibility* (Esnaola Etxaniz, 2008).

Putting all of these terms in perspective, the availability of various validated measurement instruments of physical subdomains in the literature poses a challenge due to the expansive terminology that is in use to refer to constructs measuring common attributes; for example, *perceived competence* and *perceived appearance* refer to what other scholars called athletic competence or the ability to perform sports and recreational activities in the first subdomain and physical appearance, body image, or body esteem for the latter subdomain (Babic et al., 2014). Therefore, this review elucidates terms used in specific physical subdomains and evidence for the associations between these subdomains and youths' physical activity.

The strength of the association between leisure time physical activity and the physical self-concept was measured and significant findings were unveiled by a large systematic review and meta-analysis that comprised 64 international studies (Babic et al., 2014). No ethnicities of the participants were reported in the findings. However, Babic and colleagues (2004) reported that only 17 of the studies were conducted in the United States, 1 in Mexico, and 1 in Spain. The main findings highlight that those who report high levels of physical self-concept are more likely to engage in physical activity than those with weaker beliefs about their physical attributes; physical appearance had the weakest association with leisure time physical activity; gender was a significant moderator for general physical self-concept ($p < .05$); and age was a significant moderator for perceived appearance ($p < .01$) and perceived competence ($p < .05$) (Babic et al., 2014).

The review conducted by Sallis et al. (2000) reported that physical self-competence was significantly and consistently associated with physical activity in youths, whereas the associations with self-efficacy and body image were indeterminate. Another review showed strong support for female youths' physical activity developing positive associations with perceived competence and with more positive perceptions about their body attractiveness (Biddle et al., 2005). No associations were found between youths' physical activity and self-perceptions in the review conducted by Van Der Horst et al. (2007). Body image was inconsistently associated with physical activity in the review of systematic reviews conducted by Sterdt et al. (2014). Some scholars have suggested that self-concept and physical activity are related through self-esteem (Kirkcaldy, Shephard, & Siefen, 2002). However, no studies that examined this association in exclusively Latino youths were found.

Social self-concept and physical activity. The social self-concept or perceptions on social acceptance refers to one's success in the social domain in relation with others and the ability to make friends and be popular in a group (Harter, 2012). A positive social self-concept, defined as one's possessing adequate skills in social functioning and interpersonal interactions, has been significantly associated with developing competent, well-adjusted adolescents (Ybrandt, 2008). Studies examining peer-related variables in female adolescents were few and showed an undetermined relationship between youths' physical activity and social acceptance (Biddle et al., 2005). In some studies, the social and physical domains of the self-concept were examined together in their relationship with physical activity in youths. For example, boys' and girls' higher levels of sport participation were positively associated with athletic competence, but only for boys was this associated with physical appearance and social acceptance (Balaguer, 2012). Timo et al. (2016) examined the association among perceived physical competence, physical activity, autonomous motivation, and enjoyment in physical education in early adolescents (N = 333; 60% girls). In this study, perceived physical self-competence in physical activity at grade 7 arising from interactions related to physical activity enjoyment within the social environment was a significant predictor of moderate and vigorous physical activity engagement 6 years later (Timo et al., 2016).

Most of the previous studies' samples included non-Latino youths. Only one study was found in which researchers examined the association of physical activity with social functioning and in which part of the sample consisted of Latino youths. Babey, Wolstein, and Diamant (2016) sampled youths of multiple ethnic backgrounds (*N* = 2,799; 49% female; 41% White, 30% Latinos) and found that those who participated in organizations outside of school, did volunteer work, and reported higher school support were physically active on more days than

students who reported the opposite. Compared to their peers in the study, Latino teens in this study were less likely to be involved in organizations outside of school and to have done volunteer work; however, having an athlete as a role model was associated with physical activity (Babey et al., 2016).

Perceptions of body weight and physical activity. Perceptions of body weight are conceptualized as an aspect of body image, or how one sees his or her physical body, height, weight, and attractiveness (Babic et al., 2014; Cachelin, Monreal, & Juarez, 2006; Lowery et al., 2005). The development of body self-image and perceptions of physical appearance, body attractiveness, and body weight in youths during adolescence is important as they influence youths' health and behaviors (Cox, Cole, & Laurson, 2016; Crocker et al., 2003). *Body self-image* refers to the subjective view and appraisal that merges into feelings one develops toward one's own body shape and size, including one's own weight (Kennett & Nisbet, 1998).

Perceptions about one's own weight are not free from influences (Cachelin et al., 2006). For example, a less-positive body image predicts greater physical activity over time in young, non-Latino women (Arigo, Butryn, Raggio, Stice, & Lowe, 2016). This is not a fixed perception, it may change, and it is negatively related to self-esteem, particularly more so for girls than boys (Kiviruusu et al., 2016).

Social and cultural environments shape the importance that adolescents place on body weight expectations that satisfy one's attractiveness and self-esteem needs (Wong et al., 2014). No studies examining the association of physical activity with perceptions on body weight in exclusively Latino youths were found. However, the findings of studies in other populations of youths are discussed as evidence of this association. Huang, Norman, Zabinski, Calfas, and Patrick (2007) examined the effects of a 1-year intervention in non-Latino adolescents (N = 878;

53% female; 41% non-Whites) on body image and self-esteem. The intervention targeted physical activity, sedentary and dietary behaviors, and body image differences for age, gender, and weight status at the start of the study. At the end of the study, no intervention effects on body image or self-esteem for girls or boys were found; however, the investigators found that girls who reported weight loss or weight maintenance also reported significant body image satisfaction after 6 and 12 months of the intervention and that perceptions of body weight were related to physical activity participation (Huang et al., 2007).

Shin and Nam (2015) examined the effects of gender and age on perceptions of body weight, regardless of actual weight, in Korean youths. The association between exercise and weight control was clearer among boys than among the girls. Shin and Nam (2015) found in their study (N = 3,321), comprising early and middle adolescents, that boys and girls were more likely to overestimate (17% and 24%) than underestimate (9% and 5%) their respective weights and that these two types of weight estimations were significantly different between boys and girls. Shin and Nam (2015) also found that when adolescents were asked about their weight-control practices in the previous year, more girls than boys responded that they wanted to lose weight and more boys than girls responded that they will do nothing about their weights.

Regarding youths of ethnic minority backgrounds, some scholars have suggested that these youths are protected from body image issues that are commonly found in European American populations due to different cultural values (Franko & Striegel-Moore, 2002). Carter, Smith, Bostick, and Grant (2014) were the only researchers who have examined the body image association with parental attachment in which the sample of ethnically diverse early and middle adolescents (*N* = 140, 71% female) included 30% Latinos. In their longitudinal study, Carter and colleagues (2014) found that body image mediated the relationship of attachment between father

and mother and internalizing symptoms, with outcomes further moderated by race/ethnicity but not by gender. Specifically, in Latinos, this study found that paternal attachment was related to internalizing symptoms through negative body image, while maternal attachment had direct effects on internalizing symptoms for Latinos, although negative body image did not mediate this relationship (Carter et al., 2014).

Global self-worth (self-esteem) and physical activity. *Global self-worth* refers to how much one likes oneself (Harter & Bukowski, 2012). This construct is the most stable and is at the top of the hierarchy in the self-concept, or how one perceives oneself (Esnaola Etxaniz, 2008). Between 1970 and 1998, scholars reported no associations between physical activity and global self-worth or self-esteem (Sallis et al., 2000). In a recent review, however, studies showed that youths with high levels of exercise experienced an increase in global self-worth (Babic et al., 2014). Physical activity in female youths was associated with global self-worth, with small to moderate effects; however, studies in this review were too few to draw a conclusion on the relationship between self-esteem and physical activity in girls (Biddle et al., 2005).

In studies that did not include Latino female youths, scholars reported that female adolescents who possess lower self-esteem than boys require more social support to be physically active (Garcia et al., 1995). In addition, some scholars found that normal weight does not warrant a positive self-esteem in minority children (Wong et al., 2014). However, in studies that included Latino teenagers, scholars found that participation in sports activities was correlated with high self-esteem (McClure, Tanski, Kingsbury, Gerrard, & Sargent, 2010).

Social connectedness and physical activity. *Social connectedness* refers to one's perception that people around care for the individual, including having reliable and caring relationships that provide a sense of belonging (Resnick, Harris, & Blum, 1993). Social connectedness includes parental and important non-parental relationships that take place in various contexts (i.e., family, peers, and school), exerting influence on youth development and healthy psychosocial adjustments (Bowers et al., 2014; Wilkinson-Lee, Zhang, Nuno, & Wilhelm, 2011).

The literature regarding the relationship between social connectedness and physical activity in youths is scant. What we know of this specific association was extracted from studies that comprised a small representation of Latino youths or non-Latino youths. For example, a study on 9,241 Canadian middle adolescents found that meeting physical activity guidelines was associated with lower school disconnectedness in male youths; however, being physically active was not associated with higher self-esteem in the same group (Trinh, Wong, & Faulkner, 2015).

Another study that did not include Latino adolescents found that social connectedness increased the odds of physical activity (Yang, Tan, & Cheng, 2014). In studies that included partial Latino representation, researchers found that social connectedness was a significant protective factor against health-risk behaviors (Rew, Horner, & Fouladi, 2010) and a significant predictor of physical activity in multiethnic youths (Rew et al., 2013). The results, however, are not exclusively on Latino youths, do not show whether different levels of youths' connectedness influence physical activity differently, or do not demonstrate whether age and gender have effects on the relationship.

In the extant literature on child development, social connectedness, particularly school connectedness, has been associated with positive adjustments in adolescence, and it is identified

as a protective factor against health-risk behaviors in youths (McNeely & Falci, 2004; Monahan, Oesterle, & Hawkins, 2010). However, most of these studies report no ethnicity or, if multiple ethnic youth groups are included, it is difficult to tease out the data about Latino youths. For example, a 4-wave study whose median sample size was 979 (6% Latino) middle adolescents found connectedness to be the most influencing youth outcome affected by parenting style (Bowers et al., 2014). The sample size of the Latino representation imposes a severe limitation on the conclusions of this study.

Youths who perceived low levels of warmth from parents also reported fewer feelings of connectedness to family, peers, and community and were less likely to have an important non-parental adult relationship (Bowers et al., 2014). Similarly, connectedness was also well supported in another study (N = 2,516; 55% females), in which only 6% were Latino youths, and researchers found that parent-child connectedness was associated with increased body satisfaction for females, increased self-esteem for males, and decreased depressive symptoms for both males and females (Boutelle, Eisenberg, Gregory, & Neumark-Sztainer, 2009). The study conducted by Ackard, Neumark-Sztainer, Story, and Perry (2006) on middle adolescents (N = 4,746; 51% boys; 6% Latinos) uncovered similar findings: adolescents' perceptions of low parental caring and low communication frequency were associated with unhealthy weight control, substance use, suicide attempts, body dissatisfaction, depression, and low self-esteem.

Research from relational models suggests that non-parental adults (e.g., mentors, coaches, advocates) can positively influence youths' psychosocial and behavioral outcomes, and these can be identified through five characteristics: competence, confidence, character, connection, and caring (Lerner et al., 2005). In addition, studies on school connectedness show that parents and peers are independently important socialization agents for increasing school

connectedness (Monahan et al., 2010). However, studies examining positive relational research in exclusively Latino youths are scarce (Yomtov et al., 2015).

Parent-adolescent communication and physical activity. Close relationships between parents and adolescents, secured through patterns of frequent communication, can seed a strong psychosocial foundation for youths' successful adaptation to adulthood (Crosnoe & Elder, 2004). A close parent-adolescent relationship can enhance protection against risky behaviors (Davidson & Cardemil, 2009). Evidence shows that, compared to parents of other ethnic groups, Latino parents are more likely to exercise a direct positive influence on their adolescents' behavioral outcomes through parental warmth and open and frequent communication that enables youths' healthy functioning and prevents externalization of negative behaviors (Davidson & Cardemil, 2009).

In reviews addressing parent-youth communication, scholars suggest that frequency and quality are strongly related as communication requires more time for discussion to happen between parents and adolescents (Noller & Bagi, 1985). In addition, Noller and Bagi (1985) reported that more disclosure occurs to mothers than to fathers, with daughters disclosing more to mothers than do sons. Berge, Wall, Larson, Loth, and Neumark-Sztainer (2013) found that family functioning that includes communication, structure/roles, problem-solving, and closeness/warmth was associated with less sedentary behavior and more physical activity in boys while in girls family function was associated with less sedentary behavior only.

Ornelas, Perreira, and Ayala (2007) have been the only researchers found to examine physical activity's association with parent–adolescent communication (N = 13,246; 17% Latino) in youths. In this study, Ornelas and colleagues (2007) reported that parent–child communication was calculated as the aggregate of scores of three types of communication that adolescents had

with parents or primary caregivers in the previous four weeks in aspects such as dating, personal problems, and schoolwork, with scores ranging from 0 = low to 3 = high. They found that parent-adolescent communication positively predicted moderate to vigorous physical activity in youths (Ornelas, Perreira, & Ayala, 2007).

The parent-adolescent association through monitoring and communication plays a significant role in protecting youths from health-risk behaviors (Huebner & Howell, 2003; Thoma & Huebner, 2014) and promoting academic success (Carranza, 2009). Berge and colleagues (2015) have examined parent-adolescent conversations in samples of adolescents (N = 2,793; 53% girls) in which 17% were Latino. In this study, Latino fathers reported more parent-adolescent conversations about physical activity with their sons, and Latino mothers reported more weight-focused conversations with their daughters (Berge et al., 2015).

Noteworthy is the study conducted by Berge and colleagues (2015), in which they reported that Latino mothers and fathers have more frequent conversations about physical activity with their adolescent children than parents in other ethnic groups. Even more, fathers with higher educational attainment reported having more parent–adolescent conversations about physical activity than parents with lower levels of education; and conversely, mothers with lower educational attainment reported significantly more parent–adolescent conversations about adolescents' weight and the need to exercise more to lose weight or keep from gaining weight (Berge et al., 2015).

Gaps Identified

The reviewed literature on physical activity shows several gaps in information about Latino youths. Systematic reviews revealed that physical studies have poor reporting practices of gender and ethnicity. Although these practices have improved, Latino samples were small or

absent from studies on physical activity. Therefore, the evidence that was used to support this study has built on studies that comprised participants who were mainly European American, Canadian, Australian, and multiethnic youths. On average, Latino participation sampled from multiethnic studies has been between 6% and 20%, not large enough to draw specific conclusions about physical activity associations in Latino adolescents. Similarly, another gap identified in this review was that not many psychosocial correlates have been studied (Sterdt et al., 2014).

Therefore, the extant literature does not unveil much evidence of physical activity in Latino youths. No studies, with a sample comprised of exclusively Latino youths, to date have examined the set of factors proposed in this study. Examining how age, gender, parent's marital status, family annual income, ethnic identity, perceptions of physical appearance, athletic competence, social competence, body weight, social connectedness, and parent–adolescent communication structurally influence physical activity at initial status and at rate of change can help fill a gap in research. In addition, the resulting information can potentially lead to innovative programs and interventions to promote physical activity in Latino teenagers early in life. The use of the theoretical framework, adapted from Pender's HPM, provided a healthful tool to examine the effects of influences on physical activity through middle adolescence in Latino youths.

SUMMARY

Biological and social factors have been suggested as the drivers of the start and end of adolescence (Moshman, 2005). Although different sociocultural groups assign different social meanings to adolescence, advances in research have provided a greater understanding about rapid biological and psychosocial transitions and increased vulnerability for youths. The

emergence of ego, independent decision-making, autonomy, and relatedness are important developmental milestones in adolescence, hence the importance of a forgiving, caring, and supportive environment that helps adolescents recover from behavioral mistakes and learn to assume and accept social responsibility for self in relation to others. In sum, adolescence is a vulnerable period of time that impacts one's lifelong health behavior and well-being.

Although in the overview on adolescent development, I aimed to unveil protective associations between the proposed independent and dependent variables, the findings I uncovered were limited. Research on normative development in Latino youths is not abundant (Umaña-Taylor, 2009). This review of the literature has shown that evidence about protective factors that prevent health-risk behaviors is greater than that of health-promoting factors (Steinberg, 2001, 2005; Umaña-Taylor, 2009).

In this review, I have also highlighted salient factors influencing Latino youths' development (familism, culturally driven autonomy and relatedness, use of parental warmth and parental control, and the role of women in a Latino family) that allow us to understand differences in Latino youths' upbringing from that of youths in general populations, including parenting styles built on prominent cultural values of the Latino culture. Examining the effects of individual characteristics and experiences—age, gender, parent's marital status, family annual income, ethnicity, ethnic identity —and behavior-specific cognitions and affect—perceptions of athletic competence, physical appearance, social acceptance, global self-worth, body weight, social connectedness, and parent–adolescent communication—on MPA and VPA trajectories in Latino youths throughout middle adolescence would generate important evidence.

Chapter 3: Methods

In this chapter the study method is discussed, including descriptions of the setting, the study design, recruitment strategies, sample and protection of human subjects, measurement instruments, and statistical model and analysis. This study is a secondary analysis of a longitudinal data set, "Developing Health Behaviors in Middle Adolescence (DHBMA)." The DHBMA study was a longitudinal study conducted between 2006 and 2012 and comprised adolescents of multiethnic and financially disadvantaged backgrounds (N = 1,345; 46% male) who were enrolled in Central Texas public schools, grades 9 through 12. However, the present study focused on exclusively self-reported Latino youths (N = 628).

SETTING

The location where participants in the study were recruited is just beyond the urban fringe in Central Texas (U.S. Census Bureau [USCB], 2010). The geographical area comprises communities, located within the boundaries of various high schools, operating in three school districts and sprawling across 7 to 15 miles from downtown Austin, Texas. The setting was categorized as rural because the area includes a low population density that comprises open country and settlements with fewer than 2,500 residents (USCB, 2015). Rapid population growth with increases in population density has occurred in Central Texas since 2006 (USCB, 2010).

By the year 2007, 2.5 million poor children lived in rural settings, including 15% Latino, 2 out of 3 of whom lived in high-poverty counties (O'Hare, 2009). Of the 303 high-poverty US counties reported in 2007, 62% were in the South, with many of them in Texas. These comprised communities that lacked economic opportunities and resources needed to foster positive development processes in children and adolescents (O'Hare, 2009). Compared to their peers,

adolescents who live in high-poverty rural settings are more likely to experience disadvantages brought on not only by dispersed geographical contexts and low incomes but also limited educational opportunities, limited mentorship, scarce employment, and scant community resources and government benefits (O'Hare, 2009).

Daily living contexts such as school, home, and community are very important in the development of children and adolescents due to the impact these environments have in their formative years (Bandura, 1989). Social contexts exert influence on how individuals develop their social interactions and how they see themselves or others, stimulating or undermining the development of self-competences (Schmitz, 2006) as well as facilitating or impeding access to opportunities to be physically and socially active. Studies about adolescents who live in high-poverty contexts are important to examine to gain a greater understanding of what impacts the development of their physical activity. These studies on exclusively Latino youths are few, thus making our understanding of their physical activity development incomplete (Jamieson, Araki, Chung, & Kwon, 2005).

In 2007, in Texas, the poverty threshold for a family of two adults and two children was $21,027 per year and almost 50% of students were eligible to participate in the free and reduced-price lunch (National Center for Education Statistics, 2009). Latinos in Texas make up the highest percentage (24.9%) of people living in poverty, followed by African Americans (23.2%), Asians (11.6%), and non-Latino Whites (9.3%), with 1 in 4 children under age 18 living in economic hardship (DeLuna Castro, 2015).

At the time the parent study began the recruitment of participants, the ethnic makeup across the school districts in which DHBMA took place was predominantly Latino (50%), primarily of Mexican ancestry, followed by 38% white Americans, 11% African Americans, and

others (1%) (ProximityOne, 2017; Rew, Grady, & Spoden, 2012; Rew, Horner, & Fouladi, 2010). In addition, large percentages of students were eligible for free meals or reduced-price meals (U.S. Department of Education, 2015). Students were eligible for free meals if their household incomes were less than or equal to 130% of the federal poverty level or if they were homeless, runaway, or migrant. They were also eligible for reduced-price meals if their household incomes were greater than 130% but less than or equal to 185% of the federal poverty level (U.S. Department of Education, 2015). The presence of a high number of recipients of free and reduced-price lunch in the targeted public schools corroborated reports that indicated participants lived in economically disadvantaged neighborhoods (ProximityOne, 2017; Rew et al., 2012).

STUDY DESIGN

The study design was cohort-sequential, observational, and longitudinal. In the parent study, this design facilitated researchers to rapidly recruit participants; to examine and compare contextual/risk factors, protective resources, and health-risk behaviors in multiethnic rural youths; as well as to determine how these factors predict health-risk and health-promoting behaviors through early and middle adolescence (Rew et al., 2010). Age and school grade of the participants defined the cohort of the participants in the DHBMA study (Rew, Arheart, Horner, Thompson, & Johnson, 2015).

In a cohort-sequential design, as pointed out by Duncan, Duncan, and Hops (1996) and Prinzie and Onghena (2005), researchers link cohort-sequential adjacent segments of limited longitudinal data from different age cohorts to estimate a developmental growth curve, which is built on temporally overlapping measurements of various cohort groups. Also known as the *accelerated longitudinal design*, a cohort-sequential design has been recognized as comprising

more advantages than a single-cohort longitudinal design in that it allows researchers to get results and follow up faster than in true longitudinal fashion with reduced attrition (Duncan et al., 1996).

Even more, scholars acknowledge that in a cohort-sequential design, the observed changes across age groups happen due to intra-individual change and not due to cohort effects (Prinzie & Onghena, 2005). However, it is also noted that intra-individual developmental follow-up, continuity, and prediction are not as extensive as in a true longitudinal design (Duncan et al., 1996). Therefore, a cohort-sequential design removes not only the age effects of the cohort (Prinzie & Onghena, 2005) but also lessens potential drawbacks associated with dependence and autocorrelation inherent to a true longitudinal design (Baltes, 1968). A salient strength lies in its temporality, which allows researchers to establish causality in the relationship of independent and dependent variables over time (Polit & Beck, 2012). In sum, the cohort-sequential design, by comprising observed groups of participants repeatedly over time, permits assessing stability or change, determining age and cohort effect, and raising plausible inferences across time (Diggle, 2002).

In Table 1, a diagram is used to depict the sequence of cohorts' participation utilized in the parent study. Participants' enrollment for both cohort A and cohort B started in the school year 2006–2007, including data collected in the summer of 2006 from an early cohort A that was part of an interim study. At time 2, participants in cohort A and cohort B continued taking part of the study as annual follow-ups and new participants in cohort C and cohort D were subsequently enrolled. Participants in each cohort were measured on the studied attributes four times at approximately one-year intervals over the period from 2006 to 2012. Valid data generated by

four sequential cohorts of DHBMA participants yielded 628 dyads, each comprising a Latino youth and one of that youth's parents.

Table 1

Cohort-Sequential Design to Study Change over Time

DHBMA Study Year	Grade Cohort	Grade Cohort	Grade Cohort	Grade Cohort
Summer–2006	9th A			
2006– 2007	9th B	10th A		
2007–2008	9th C	10th B	11th A	
2008–2009	9th D	10th C	11th B	12th A
2009–2010		10th D	11th C	12th B
2010–2011			11th D	12th C
2011–2012				12th D

STUDY PROCEDURES

Recruitment. A nonprobability sample of participants was recruited after the parent study received institutional approval from The University of Texas at Austin Institutional Review Board (IRB) in 2006. The institutional approval was reviewed annually thereafter throughout 2012. In addition, and given the nature of sensitive questions posed to the adolescent participants about sexual activity and drug and alcohol use, the parent study kept a Certificate of Confidentiality from the National Institutes of Health (NIH) throughout the study. Youths' participation in the study was voluntary, and participants had the option to discontinue participating in the study at any time. As part of their participation, youths were assured privacy and confidentiality with their information. Throughout the duration of their participation in the study, the youths' parents provided annual informed consent, and the youths provided annual assent.

At the time, personal invitation letters, both in English and Spanish, and a consent form informing candidates of the purpose, risks, benefits, and study procedures were sent to each of the youths and his or her respective parent. After parents returned the intent-to-participate card, informing researchers of their desire to let adolescents participate in the study, an appointment was scheduled in which parents consented and adolescents assented their respective enrollments (Rew et al., 2012).

Data were collected in person at the homes of the participants at a suitable time for youths and their parents (Rew, Arheart, Thompson, & Johnson, 2013; Rew et al., 2012). Data from parents were collected only one time, at enrollment in the DHBMA study; however, parents provided written consent forms annually for youths under 18 years of age. Youths' data were

collected annually unless participants had moved out of the school or school district. Participants completed the study when they reached grade 12 (Rew et al., 2013).

Protection of Human Subjects. This study was exempted from human subjects research approval. Instead, The University of Texas at Austin Institutional Review Board granted this study a nonhuman subject research determination permission (FWA# 00002030) to conduct a secondary analysis of data (see Appendix A).

Sample. The inclusion criteria for data of participants included in this secondary analysis were as follows: 1) self-identified Latino: male or female; 2) at least 14 years old and no older than 18; and 3) attended one of the targeted high schools. Data from 628 dyads (Latino youths and youth's one parent) met the inclusion criteria. From time 1 to time 4, the attrition in the present study was 23%.

MEASUREMENT INSTRUMENTS

Seven measurement instruments were selected for the present study (see Appendix B). However, participants in the parent study completed a set of 22 valid and reliable instruments (Rew et al., 2013). As reported elsewhere (Rew et al., 2010), these instruments were translated into Spanish by a bilingual professional translator and back-translated into English by a second professional bilingual translator who did not see the original instruments, and the outcomes of both translating processes were followed by a symmetrical translation. The last translation step included consulting an advisory panel not involved in any of the translation processes for clarity and appropriate wording of the scale items (Rew et al., 2010). The percentage of students and parents who took the Spanish version of the surveys could not be estimated with the available data.

To facilitate a comprehensive and orderly review of the measures, the framework of the Health Promotion Model (HPM; Pender, Parsons, & Murdaugh, 2006) was followed to review the instruments and their psychometric characteristics. This framework has been characterized as ideal for organizing variables and examining changing relationships of various constructs in adolescents over time (Srof & Velsor-Friedrich, 2006). The selected seven instruments are first outlined; next, the variables, measurement instruments, and Cronbach's alpha coefficients for the current study are shown in Table 2; and finally, each specific instrument definition with respective psychometric properties are addressed more in detail later in this section.

The HPM framework provides three broad categories: behavior outcome, individual characteristics and experience, and behavior-specific cognitions and affects. First, the behavior outcome in this study was physical activity manifested by two suboutcomes, moderate physical activity (MPA) and vigorous physical activity (VPA), which are addressed after this introductory outline of the seven instruments. These were each measured by a respective single-item instrument included in the Youth Risk Behavior Survey (YRBS). Next, the individual characteristics and experiences (age, gender, ethnicity, ethnic identity, parents' marital status, and family annual income) were measured by items in the demographic form. Youths' ethnic identity was measured by the Multigroup Ethnic Identity Measure (MEIM). Last, behavior-specific cognitions and affect (perceptions of physical appearance, social acceptance, athletic competence, and global self-worth) were measured by specific subscales of the What I Am Like (WIAL) Scale; perceptions of body weight were measured by a single-item instrument comprised within the YRBS; social connectedness was measured by the Social Connectedness Scale; and parent–adolescent communication was measured by the Parent–Adolescent Communication Scale.

Table 2

Overview of Study Instruments

Instrument	Scale/Subscale	Number of Items	Variable	Cronbach's Alpha
Demographic form	N/A	4	Age, gender, parent's marital status, & family income	N/A
Multigroup Measure of Ethnic Identity (MMEI)	MMEI Scale	14	Ethnic identity	.87–.88
Youth Risk Behavior Survey (YRBS)	Moderate Physical Activity single-item	1	Moderate physical activity	N/A
	Vigorous Physical Activity single-item	1	Vigorous physical activity	N/A
	(Perception of) Body Weight single-item	1	Body weight	N/A
What I Am Like (WIAL) Scale	Physical Appearance	5	Physical appearance	.73–.75
	Athletic Competence	5	Athletic competence	.76–.83
	Social Acceptance	5	Social acceptance	.54–.61
	Global Self-Worth	5	Self-worth (self-esteem)	.68–.70
Social Connectedness Scale (SCS)	Social Connectedness	10	Social connectedness	.83–.87
Parent-Adolescent Communication Scale	Parent-Adolescent Communication	4	Parent-adolescent communication	.70–.75

BEHAVIOR OUTCOME

Physical Activity, Youth Risk Behavior Survey (YRBS).

Description. Physical activity is the behavior outcome of central interest in this study. Prior to 2008, physical activity in children and adolescents was assigned different recommendations; these included 30 minutes of moderate activity for at least 5 days of the week and 20 minutes of vigorous activity at least 3 days of the week (Brener et al., 2004). Current guidelines integrate body movements of moderate and vigorous intensity to 1 hour of daily moderate to vigorous physical activity (U.S. Department of Health and Human Services, 2008). The instruments used in this study followed the physical activity guidelines used prior to 2008. Conceptually, the intensity of the bodily movements can be vigorous and moderate, and the aggregation of them contributes to overall physical activity (Corbin, Pangrazi, & Welk, 1994; Kumar, Robinson, & Till, 2015).

For the aims of this study, two distinct single-item measures of the YRBS physical activity subscale were selected to estimate the physical activity participation of the sample. Specifically, one of these items measured the frequency and duration of moderate body movements, whereas the other item measured the frequency and duration of the vigorous body movements (Brener et al., 2004). However, the YRBS included 5 other single-item instruments, for a total of 7, measuring different domains related to physical activity in youths (Grunbaum et al., 2004). The single-item results can be used to represent a score of any targeted activity (Eaton et al., 2012). For instance, one of the single-item instruments measures youths' screen time, another measures school physical education attendance, and another measures physical injuries incurred while playing sports. Items unrelated to the aims of the present study were disregarded.

The first single-item measurement targeted moderate physical activity (MPA), which included body movements that did not make individuals sweat or breathe hard—for instance, walking for leisure, slow bicycling, or mopping the floors (Grunbaum et al., 2004). Specifically, participants were asked, "How many of the past 7 days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard?" The response options fit within a continuous level of measurement that ranged from 0 days (option 0) to 7 days (option 7) to indicate the frequency of MPA per week.

The second single-item measurement targeted vigorous physical activity (VPA), which comprised body movements that make individuals sweat and breathe hard—for instance, playing soccer, running, or fast bicycling (Grunbaum et al., 2004). Specifically, with this item participants were asked, "How many of the past 7 days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard?" The response options fall within a continuous level of measurement that ranged from 0 days (option 0) to 7 days (option 7) to indicate the frequency of VPA per week.

Validity and reliability. The YRBS single-item VPA and MPA measures are unambiguous and follow an easy-to-use format showing face validity, or a distinct delimitation of the content (intensity) of each physical activity construct (Netemeyer, Bearden, & Sharma, 2003). For this study, convergent and discriminant validity of the two single-item measures were estimated by the degree of interrelatedness between the mean scores of MPA and VPA that were measured at the same time point. The inter-item correlation matrix of VPA and MPA for each time point was closely examined for correlation coefficients equal to or above 0.70 that would indicate an overlap between the two single-item constructs (Gardner, Cummins, Dunham, & Pierce, 1998). The correlations between MPA and VPA were significantly ($p < .05$) low, ranging

from $r = 0.25$ at time 1 through $r = 0.42$ at time 4; thus showing little to no overlap of the two constructs. However, the limited convergence of the MPA and VPA content became evidence of the discriminant validity of these two single-item measures (Netemeyer et al., 2003; Nunnally, 1978).

Validation for the single items (VPA and MPA) was also assessed by using a reference standard, the Physical Participation subscale (PPs), which is part of the Adolescent Lifestyle Style Questionnaire (Gillis, 1997), and was measured by DHBMA researchers at the same time point of these two single items. The PPs comprises 4 items, with a 6-response option each, to measure adolescents' physical (active) participation in healthy lifestyles. For example, a question on this subscale will prompt youths to select an option from never (1) to (6) always if "in an average week, they had exercised 3 to 4 times such as running, taking long walks, dancing, playing ball, and swimming." Gillis (1997) reported a Cronbach's alpha coefficient of .82 for the PPs in a cross-sectional study (N = 292) that included rural Canadian adolescents aged 12 to 19 (mean age 15.9). For this study, the internal consistency of the PPs ranged from 0.89 to 0.90 at each of the different four time points.

Significantly moderate correlations were found between the mean score of the PPs and the VPA single-item measure from time 1 through time 4, ranging from $r = .63$ to $r = .69$, $p < .001$. In turn, except for time 1, the correlations between the PPs and MPA at time 2 through time 4 showed significant but weaker relationships, ranging from $r = .29$ to $r = .34$, $p < .001$. These results suggested that convergent validity was stronger for VPA and PPs than for MPA and PPs. At time 1, or when youths were in grade 9, the correlation between mean PPs scores and MPA ($r = 0.16$, $p < .001$) was little or nonexistent (Gill, Jones, Zou, & Speechley, 2012). A possible reason for this weak correlation between MPA with a parallel measure was offered by

scholars of a large study on YRBS methodology, who pointed out that students in lower school grades had the least consistent responses in the YRBS questionnaires (Brener et al., 2004). An alternative explanation considers that PPs must not be the best parallel measure to examine the convergent validity of MPA.

The Centers for Disease Control and Prevention (CDC) assessed the test-retest (two weeks apart) reliability of the 1999 YRBS questionnaire, including the two single-item VPA and MPA measures. This study comprised 4,619 male and female high school students from diverse racial/ethnic backgrounds and revealed a mean moderate kappa 55.2, 95% CI [52.3,58.1] for physical activity with no significant differences in mean kappa values by race/ethnicity, gender, and grade (Brener et al., 2002). For the present analysis, no data on MPA or VPA, 10 to 14 days apart, were available to estimate test-retest reliability.

The minimum reliability for the MPA and VPA single-item measures were also estimated by using the attenuation method calculation (Dolbier, Webster, McCalister, Mallon, & Steinhardt, 2005). As described by Dolbier et al. (2005), this formula solves for the minimum reliability of a single-item measure by assuming that the probability of the correlation between *x* and *y* is a true underlying correlation if *x* and *y* were measured perfectly (1.0). In this study, the single-item measure (either VPA or MPA) was represented by *x* and the multi-item measure (the mean of the PPs) was represented by *y*. To solve the minimum reliability of *x* or the single item, in the attenuation formula a more conservative correlation (.90) is assigned. For VPA, the minimum reliability was moderately adequate (.54 at time 1, .59 at time 2, .65 at time 3, and .56 at time 4). However, for MPA, the minimum reliability was not adequately validated (.03 at time 1, .12 at time 2 and time 3, and .16 at time 4). As pointed out earlier, the PPs was not an adequate multi-item measure to validate a minimum reliability for MPA.

It is noteworthy that instruments measuring MPA in youths and even adults, including multi-item measures, have often shown lower reliability and lower kappa statistics scores than instruments measuring VPA (Brener et al., 2004; Brown, Trost, Bauman, Mummery, & Owen, 2004; Craig et al., 2003). Physical activity measures rely on individuals' cognitive and memory developmental abilities to differentiate moderate from vigorous activities in self-reports. It may be easier for younger individuals to remember activities in which they exerted a higher (vigorous) effort than activities with lower (moderate) effort (Brener, Collins, Kann, Warren, & Williams, 1995; Brener et al., 2004). Although the MPA single-item instrument in this study had low reliability, studies using the same single-item instrument reported adequate test-retest reliability and comparable patterns of MPA distributions among the participants (Li, Treuth, & Wang, 2010).

INDIVIDUAL CHARACTERISTICS AND EXPERIENCES

Demographic form. Age, gender, ethnicity, parent's marital status, and family annual income were measured by items included in the demographic form. These were considered independent variables in the model. The demographic form was completed by each participant's parent at enrollment. The participant's age was calculated from the participant's reported birthday. This study included only data from youths who responded positively to the specific question on whether their ethnicity was Latino. Gender comprised two categories: (1) male and (2) female, with female recoded as zero for the statistical equations. Parent's marital status was originally measured as five categories: (1) married, (2) separated, (3) widowed, (4) divorced, and (5) single. However, for this study, this variable was recoded as (1) married and (0) non-married for all the other categories (separated, widowed, divorced, and single). Family income was measured as a continuous variable of 12 categories from (1) under $20,000/year to (12) $150,000/year and over.

Multigroup Ethnic Identity Measure (MEIM)

Description. In this study, ethnic identity variable measured at time 1 and a change score from time 1 to time 4 were covariates in the testing of a hypothesized developmental physical activity model. Change was calculated by subtracting from the mean score of ethnic identity at time 4 the mean score of ethnic identity at time 1. Ethnic identity was measured by the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). The MEIM is a 14-item measure of ethnic identity, or the feelings one has about one's own ethnicity. Since its publication in 1992, the MEIM has been widely used to measure the underlying sense of ethnic identity in adolescents and emergent adults, including adults in general (Blozis & Villarreal, 2014). Items on the MEIM scale are rated on a 4-point scale, from (4) strongly agree to (1) strongly disagree, including two reverse-coded items. The questions on this scale were measured by summing across items and calculating the mean score, with a possible range of 1 to 4. High scores indicate a high ethnic identity.

The MEIM is anchored in Erik Erickson's developmental theory and in Henri Tajfel's social identity theory (Phinney, 1992). As cited by Roberts and colleagues (1999), Erickson's theory postulates that identity formation in the adolescent years takes place through a process of exploration and commitment, leading to a decision about important identity domains. In addition, Tajfel's theory posits that group identity is an important aspect of the self-concept and that individuals yearn for a sense of belonging to a group and have feelings and attitudes attached to that membership (Roberts et al., 1999).

The MEIM is made up of two subscales: a 5-item Affirmation/Belonging subscale and a 7-item Ethnic Identity subscale, as well as two items on ethnic behaviors. Phinney (1992) reported validity results for the two subscales with separate reliability scores and explained that

behavioral items were not tested because there were only two of them; however, he added them to the MEIM because the scale's reliability scores increased with their inclusion. Phinney (1992) found higher reliability scores in samples of college students than in samples of high school students, suggesting that these subscales discriminate between developmental processes and are more reliable in older than in younger adolescents.

Validity and reliability. The MEIM is a valid and reliable instrument with consistent (≥ .80) Cronbach's alpha coefficients (Phinney, 1992; Ponterotto, Gretchen, Utsey, Stracuzzi, & Saya, 2003). The results of a factor analysis of a large study (N = 5,423) conducted by Roberts and colleagues (1999) showed meaningful ethnic differences among the participating youths although the interfactor correlations for the three ethnic groups were similar: r = .74 for European Americans, r = .70 for African Americans, and r =.75 for Mexican Americans. Roberts and colleagues (1999) found out that European Americans had the lowest ethnic identity scores; the scale also showed a positive relationship with indicators of psychological well-being.

A Cronbach's alpha of .81 was obtained when the measure was administrated to 417 urban high school students [182 (44%) males; mean age 16.5; 89 (21%) Latinos] of multiethnic and diverse socioeconomic backgrounds who lived in Southern California (Phinney, 1992). DHBMA researchers reported Cronbach's alpha coefficients ranging from .88 to .89 in an analytical sample of 602 youths of multiethnic backgrounds (Rew, Arheart, Johnson, & Spoden, 2015). For this study on 628 exclusively self-reported Latino middle adolescents, the Cronbach's alpha scores ranged from .87 to .89.

BEHAVIOR-SPECIFIC COGNITIONS AND AFFECT

What I Am Like (WIAL) Scale.

Description. In general, the WIAL scale comprises 45 items and measures individual self-perceptions or evaluative distinctions that growing children make about their competence or adequacy in various domains of their lives (Harter, 2012). Drawing on the works of self-theorists James (1892) and Cooley (1922), the WIAL structure includes measurement subscales for the following specific domains: scholastic, job competence, romantic appeal, physical appearance, social acceptance, athletic competence, behavioral conduct, close friendships, and global self-worth (Harter, 2012).

Included in this study as predictors of change in the hypothesized physical activity models were selected WIAL subscales with variables measured at time 1 and a change score from time 1 to time 4. Selected subscales were physical appearance, athletic competence, social acceptance, and global self-worth. These were selected based on a review of the adolescent physical activity literature (see Chapter 2). For instance, there was evidence of significant associations between the physical domain and physical activity in youths (Babic et al., 2014). There was also significant evidence suggesting a multiple mediating model of interrelations among physical self-perceptions, self-perceptions of social competence, and perceptions of global self-worth impacting motor ability and physical activity differently in female and male youths (Schmidt, Blum, Valkanover, & Conzelmann, 2015; Ybrandt, 2008). The change score was calculated as time 4 minus time 1.

Each subscale comprises 5 items and a structured alternative format to offset the tendency to give socially desirable responses (Harter, 2012)—for example, “Some teenagers find it hard to make friends. **But** For other teenagers it’s pretty easy.” The participant was then given

four possible response types and asked to select one answer: (1) really true for me, (2) sort of true for me, (3) sort of true for me, and (4) really true for me, with two of the responses signaling the left of the sentence (before the bolded **But**) and the other two the right of it (Harter, 2012). The subscales are independent measures and include some reverse-coded items. Each item is rated on a 4-point scale, from 1 to 4, where (1) indicates the lowest perceived competence and (4) the highest level of competence.

The subscales have been widely used in middle adolescents, corresponding to grades 9 to 12 in the American educational system. However, Harter (2012) has cautioned researchers when interpreting WIAL results because this measure is not culturally sensitive. The WIAL was designed for use with American children, and its use is not appropriate in other countries and cultures; evidence of its inappropriate use has been shown by inadequate psychometric properties (Harter, 2012, p. 28). Phinney (1996) has also cautioned about interpreting and generalizing results based on ethnic groups because several factors (e.g., income, education, family composition, and social context) influence the self-concept and ethnic identity, thus resulting in ethnic heterogeneity among members of the same group.

For this study, participants were assumed to be culturally similar, Latino American children who were enrolled in the American educational system and were competent to understand the format and questions of the four selected subscales. However, caution was taken to interpret the results based on complex socioeconomic and culturally driven influences on the still-forming self-concept and ethnic identity of Latino youths (Phinney, 1996; Umaña-Taylor, 2009).

Validity and reliability. Various forms of validity for the subscales have been well documented (Harter, 2012; Wichstrøm, 1995; Worrell, 1997). The 9 subscales have shown adequate reliability with scores ranging from .55 to .93 (Harter, 2012). However, test-retest reliability statistics were not recommended as an index of stability because "self-perceptions can and do change realistically" (Harter, 2012, p. 17). Next, specific subscales selected for this study are described.

Physical appearance. Items on the Physical Appearance subscale measure adolescents' feelings about whether they are good looking or like their own faces and hair, and the extent to which they are happy with their appearance (Harter, 2012). This subscale comprises 5 items in a structured alternative format. An example of an item is, "Some teenagers are not happy with the way they look**. But** Other teenagers are happy with the way they look." The internal consistency of this subscale in this study was adequate, with Cronbach's alpha coefficients ranging from .73 to .75 over the four time points.

Athletic competence. Items on Athletic Competence measure participants' perception of their ability to do well in athletic activities involving the use of physical skills and to demonstrate athletic prowess (Harter, 2012). This subscale comprises 5 items in a structured alternative format. An example of an item is, "Some teenagers do not feel that they are very athletic. **But** Other teenagers feel that they are very athletic." The items showed good internal consistency in this study, with Cronbach's alpha coefficients ranging from .76 to .83 over the four time points.

Social acceptance. Items on Social Acceptance measure the characteristics of the self that define participants' success in the social domain. These domain-specific items tap issues such as understanding what it takes to be popular or knowing how to make friends (Harter, 2012). This subscale comprises 5 items. An example of an item is, "Some teenagers are popular with others their age. ***But*** Other teenagers are not very popular." Items of this subscale had a fair internal consistency, with Cronbach's alpha coefficients ranging from .54 to .61 over the four time points.

Global self-worth. The 5-item Global Self-Worth subscale measures how much participants like themselves as human beings, overall. This scale taps self-esteem directly. Unlike domain-specific judgment of ability, this subscale constitutes a general perception of self. This subscale has its own set of items and is scored separately (Harter, 2012). An example of an item is, "Some teenagers like the kind of people they are. ***But*** Other teenagers often wish they were someone else." The internal consistency of items in this subscale was moderate, with Cronbach's alpha coefficients ranging from .68 to .70 over the four time points.

Body Weight Single Item Subscale

Description. Body weight subscales are single-item measures included in the YRBS, with each measuring different aspects of adolescents' perceptions and intentions regarding their body weight, regardless of actual body weight. For this study, a single-item measure was selected to measure adolescents' perceptions about their body weight. This measure asked participants, "How would you describe your body weight?" The possible answers were "1 = very underweight or slightly underweight"; "2= about the right weight"; "3 = slightly overweight"; and "4= very overweight." Included in this study as predictors of change in the hypothesized physical activity models were body weight (perception) measured at time 1 and a change score from time 1 to time 4.

Evidence suggests that perceptions of body weight are linked to intrinsic motivation exerting influence on physical activity and efforts to control or decrease weight in non-Latino (Allender, Cowburn, & Foster, 2006) and Latino youths (Berge et al., 2013; Berge et al., 2015; Shi, Tubb, Fingers, Chen, & Caffrey, 2013; Wright, 2011). Nationwide, in 2015, more Latino high school students (53%) than White (44%) or Black high school students (39%) were trying to lose weight (Kann et al., 2016).

Validity and reliability. The YRBS Body Weight single-item measure is unambiguous and follows an easy-to-use format with a distinct delimitation of each weight construct category that was queried for in the item, thus embedding face validity (Netemeyer et al., 2003) in multiple studies (Brener et al., 1995; Brener et al., 2002; Eaton et al., 2012; Grunbaum et al., 2004). Kappa statistics for body weight single-item measures ranged from 57.6% to 58.6% in a study that comprised a national representative sample (Brener et al., 2002), suggesting a moderate reliability.

In lieu of data to examine kappa statistics or test-retest relibility, for this study the means of the scores of body weight from each different time point were correlated to determine stability or consistency of the measures even though many events may have affected adolescents' perceptions of their body weight over a year. The scores rendered stable correlations that ranged from r =.67 (between time 1 and time 2) to r = .73 (between time 2 and time 3) and r = .72 (between time 3 and time 4).

Validation for the Body Weight single-item measure was also assessed by using a reference standard; in this case, the Physical Appearance subscale from the WIAL scale was used for this purpose. In this study, perceptions of body weight were conceptualized as an aspect of body image, or how one sees his or her physical body, height, weight, and attractiveness (Babic et al., 2014; Cachelin, Monreal, & Juarez, 2006; Lowery et al., 2005). Therefore, the Physical Appearance subscale was selected as the most appropriate parallel measure to estimate the minimum reliability for body weight single-item measure by the attenuation method calculation (Dolbier et al., 2005).

The Cronbach's alpha coefficients for physical appearance were measured at the same time point that body weight was, with the following coefficients: .74 (time 1); .73 (time 2); .74 (time 3); and .75 (time 4). The minimum reliability for body weight by attenuation method were low (.17 at time 1; .25 at time 2; .20 at time 3; and .27 at time 4), suggesting that the Physical Appearance subscale was not an adequate multi-item measure to validate a minimum reliability for the body weight single-item measure in this sample of Latino middle adolescents.

Social Connectedness Scale

Description. Social connectedness measured at the first assessment (time 1) and change scores in social connectedness calculated as time 4 minus time 1 were included in the hypothesized structural model testing as covariates of physical activity. The Social Connectedness scale measures youths' perceptions of reliable nurturing, caring relations, and connectedness with others, within or outside family boundaries (Resnick, Harris, & Blum, 1993). Examples of the scale items include the questions, "How much do family care about your feelings?" and "How much do your parents care about you?"

Perceptions of social connectedness are seen as protective factors against stressors associated with adversity of various domains—socioeconomic and environmental. Without social connectedness, adolescents, who are undergoing developmental changes in multiple domains, would experience negative health outcomes facilitated by those stressors. Items on the Social Connectedness scale are rated on a 4-point Likert scale, from (1) none to (4) very much, indicating the participant's beliefs that others care for her or him, including one reverse-coded item. The questions on this scale were measured by summing across items and calculating the mean score, with a possible range of 1 to 4. High scores indicate high social connectedness.

Validity and reliability. Harris, Resnick, Rosenwinkel, and Blum (1990) reported that they identified four discriminant models of connectedness, which were more powerful than demographic variables against clusters of high-risk behaviors, for boys and girls and reported substantial reliability for females ($\alpha = .92$) and males ($\alpha = .96$) in grade 7. Their analysis also identified explanatory variables: family connectedness, school connectedness, a composite variable of low family stress, and religious connectedness (Resnick et al., 1993). For this study addressing 628 Latino middle adolescents, the internal consistency of the items was good, with Cronbach's alpha coefficients ranging from .83 to .87 over the four time points.

Parent–Adolescent Communication

Description. Parent-Adolescent Communication (PAC) measured at time 1 and change scores in PAC over time were selected as covariates of physical activity intercept and slope. The change score was calculated by subtracting time 1 from time 4. The adapted PAC instrument measures the frequency of the communication between parent and adolescent in four different domains: job or education plans after high school; personal problems/concerns; teachers or classes in school; and things to enjoy. Questions regarding drugs and alcohol, sex or birth control, and dating were removed from the original PAC scale (Huebner & Howell, 2003) for this study.

Items were selected because of their focus on the communication frequency that an adolescent and his or her parent would have regarding a job or education after high school, personal problems or concerns, teachers or classes in school, and things that the adolescent enjoys. These were also selected due to their potential proximity to physical activities. The response options were rated as (1) never, (2) rarely, (3) often, and (4) very often. The scores were analyzed by their mean scores. High scores indicate high levels of communication between

parent and adolescent. The review of the literature in Chapter 2 suggested that physical activity and parent–adolescent communication are significantly related with each other.

Validity and reliability. Huebner and Howell (2003) reported a Cronbach's alpha of .81 for the original 7-item scale. For this study, the adapted 4-item Parent–Adolescent Communication scale demonstrated adequate reliability, with Cronbach's alpha coefficients ranging from .70 to .75 over the four time points.

Data analysis. The statistical analysis for this study was performed using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM, 2013) and Analysis of Moment Structures (AMOS) version 24.0 (IBM, 2015). The level of statistical significance for this study was set at $p < .05$, or a critical ratio (CR) of ≥ 1.96. A *p*-value larger than .05 or a CR below 1.96 indicates that any observed difference can be explained by sample variability. One-way repeated measures ANOVA was used to determine the statistical significance of the trend line for each of the independent variables. However, this study used structural equation modeling (SEM) as the main statistical method to address the research questions and hypothesized relationships in the models. Contrary to other statistical procedures of hypothesis testing, the objective of testing a model in SEM is not to reject the null hypothesis (Byrne, 2013a, p. 70). A nonsignificant chi-square for the model fitting is preferred, but this is not critical as the model fitting uses several other indicators that are discussed later in the chapter (Byrne, 2013a).

The analyses included (1) a preanalysis to assess data for completeness, missing patterns, data normality, and identification of outliers; (2) descriptive statistics to examine the characteristics of the participants and the study's variables; (3) a correlation matrix of multiple variables to examine relationships among variables; (4) testing a hypothesized conceptual model of physical activity to examine developmental change in Latino youths; and (5) testing the

assumption of invariance among the cohorts in the structural model. Examining the evidence of multigroup invariance is highly recommended to cross-validate the study findings. The objective of this test was to find a source of noninvariance among the cohorts; in other words, the results of this test answer the question of whether the model represents the data well across the different cohorts (Byrne, 2013a, p. 197) of Latino youths in this study.

STRUCTURAL EQUATION MODELING ASSUMPTIONS

In the analysis of covariance and mean structures when using SEM, it is recommended to meet two important assumptions: (1) data are of a continuous scale, and (2) data show a multivariate normal distribution (Byrne, 2013a). A distribution is multivariate normal when each variable under consideration is normally distributed in regard to each other variable in the study (Duncan, Duncan, & Strycker, 2001). The normality in the distribution of multivariate data justifies the use of maximum likelihood estimation (Crisci, 2012).

Data preanalysis. Prior to the statistical analysis, a pilot analysis of data was conducted on a small sample (n = 113) of participants with full valid data at every single point. No significant issues with data distribution were found. Next, the preanalysis was conducted on all the available data. No kurtotic items were found in the available data. Univariate normality of the dependent variable(s) was a necessary condition for multivariate normality. Overall mean univariate and multivariate skewness was < 3 and kurtosis was < 7, indicating that variables were considered normally distributed. Skewness "above the recommended limit would have impacted the test of means, while evidence of kurtosis in the data distribution would have severely impacted variance and covariance" (Byrne, 2013a, p. 103).

Outliers and missing values may exert influence on the reliability of the results and the goodness-of-fit measures in SEM (Davey & Savla, 2010; Schafer & Graham, 2002). To avoid

compromising the results of this study, meticulous actions in the preanalysis were directed to determining missing values patterns and identifying influencing outliers. Consulting with a specialist at the Department of Statistics and Data Sciences facilitated learning strategies to systematically assess data for completeness and patterns of missingness. Data comprised values for 53 variables at each time point of the study, except for data related to family annual income and parent's marital status, which were collected only at enrollment. The data also contained subsets with various stages of completeness (see Table 3).

Table 3

Patterns of Data Completeness by Type of Case over Time

Time Point	Cases (N = 628)							
	Valid cases with 53 variables		Cases with missing values		Nonparticipant cases		Total (%)	
	f	%	*f*	%	*f*	%	*f*	%
1	326	51.9	125	19.9	177	28.2	628	100
2	332	52.9	129	20.5	167	26.6	628	100
3	341	54.3	97	15.4	190	30.3	628	100
4	317	50.5	68	10.8	243	38.7	628	100

In Table 3, three distinctive patterns of data completeness available for this study are displayed. A participant with 53 values at each time point was called a valid case, and these made up the first group. At time 1, valid cases represented 51.9% of participants in all cohorts and those for whom data may also be available at subsequent time points across the developmental curve. For example, some participants may have data at only time 1, some may have data at time 1 and time 4 only, whereas other participants may have data at 3 or all 4 time points. In Table 3, we also see 28.2% who were not yet participants at time 1 and therefore have no data. A percentage of missingness is a characteristic attribute of adjoining segments of data

in a cohort sequential design (Baltes, 1968). The last pattern on this table comprises participants with missing values or nonresponses, who at time 1 made up 19.9%.

The last two types of cases reflect an important methodological issue when addressing data completeness, and the distinction is relevant in understanding their influence on the analysis and results. Only at time 1, the baseline number of enrolled participants or cases in this study has no dropouts. However, with each successive time point of data collection, the probability of not having data at additional time points for a subset of the overall sample increases (Duncan & Duncan, 1994; McArdle & Hamagami, 1992). Cases with missing data or nonresponse patterns at each time point in this study are shown in Table 4. Most of the participants who were missing data were missing it on only one variable at the four time points. Participants with more than 30 missing values at time 1 were no more than at other time points. However, these cases were kept because they had valid data at other time points. Fewer than 21% of participants had missing data at any time point (Table 4).

Maximum Likelihood (ML) was the method provided by AMOS statistical software to address missing data. This method represents a direct approach based on full information and is theoretically based (Arbuckle, 1996). Unlike the multiple imputation method, "maximum likelihood does not impute any missing data. It estimates parameters directly using all the information that is already contained in the incomplete data set" (Dong & Peng, 2013, p. 8). I will discuss maximum likelihood estimation in further detail later in this chapter.

Table 4

Cases with Missing Values Based on 53 Variables over Time

Missing Values (n = 53)	Cases (N = 628)							
	Time 1		Time 2		Time 3		Time 4	
	f	%	***f***	%	***f***	%	***f***	%
1	66	10.5	73	11.6	62	9.9	28	4.5
2	16	2.5	17	2.7	8	1.3	12	1.9
3	2	0.3	5	0.8	4	0.6	2	0.3
4–6	10	1.6	14	2.2	6	0.9	9	1.4
7–13	8	1.4	2	0.3	2	0.3	4	0.7
14–21	2	0.3	3	0.5	2	0.3	2	0.3
22–30	7	1.1	9	1.4	10	1.6	9	1.4
31–38	14	2.2	6	1.0	3	0.5	2	0.3
Total	125	19.9	129	20.5	97	15.4	68	10.8

Independent t-tests for gender and one-way ANOVA for cohorts were run to examine missing differences in the sample at each time point. No gender differences on missingness were statistically significant ($p \geq .05$). However, there were statistically significant ($p < .05$) sample size and missing differences among the cohorts. For example, at time 1, cohort B, comprising 122 participants, was larger than cohort C (n = 59), cohort A (n = 66), and cohort D (n = 55). The mean missingness of Cohort B was 6.70 (SE = 2.6) significantly ($p < .05$) larger than the mean missingness of cohort C 4.46 (SE = 3.2).

Statistically significant differences in missingness among the cohorts were also noted at time 2 and time 3. At time 2, cohort A had the largest size with 93 participants and showed statistically significant ($p < .05$) differences in mean missingness from the other cohorts. At time 3, cohort B was the largest with 93 participants and had statistically significant ($p < .05$) differences from the other cohorts. At time 4, the sizes of the cohorts did not significantly differ from one another, and there were no statistical differences in missingness among them. Correlations of missingness with the mean scores of VPA and MPA showed no statistically

significant ($p \geq .05$) effects at each time point, suggesting that data was representative of all physical activity levels in the sample.

The preanalysis also included assessing for the presence of outliers. Outliers represent cases with scores that are substantially different from others. Univariate outliers were not found in the preanalysis in which plots and scatter diagrams were used. In addition, determining the presence of multivariate outliers in the sample was also conducted. Multivariate outliers include extreme scores on two or more variables, and the AMOS statistical package provides a convenient output with this information. The computation of the squared Mahalanobis distance (D^2) for each case was closely examined to identify multivariate outliers when building the initial measurement models. Mahalanobis distance measures the units of standard deviations between a set of scores for one case and the means of the sample for all variables (Byrne, 2013a, p. 106). No significant multivariate outliers were identified in the data. A correlation matrix in the AMOS output was also examined for Multicollinearity (Polit & Beck, 2012). However, no correlation above .90 (Bobko, 2001) was found among the variables in the model.

ADDRESSING MISSING VALUES OR CASES WITH NONRESPONSE

In addressing data missingness or nonresponse, experts recommend that researchers have a clear understanding of the amount of missingness and the pattern of missingness existing in the data (Arbuckle, 1996; Byrne, 2010a; Graham, 2003; Rubin, 1996; Schafer & Graham, 2002). The literature on missingness cites three primary patterns of missing values: (1) missing completely at random (MCAR); (2) missing at random (MAR); and (3) nonignorable (systematic) missing at random (NMAR) (Arbuckle, 1996; Byrne, 2010b; Enders & Bandalos, 2001; Rubin, 1996). MCAR refers to missingness that is independent of the observed and unobserved values of all other variables in the data; NMAR is nonrandom missing of a

systematic nature; and MAR is a missingness type that is independent only of the missing values and not of the observed values of other variables in the data (Schafer & Graham, 2002).

A close examination of data allowed me to quantify data missingness in this study, as discussed earlier. Regarding the pattern of missingness of the data, the characteristics associated with the MAR pattern of missingness were evident. For example, age of the participant missing from the database at time 1 was available in the data collected at either time 3 or time 4. This example of missingness was not independent of observed values of other variables at other time points.

Several methods have been used to address missing or incomplete data. I addressed handling missing data with maximum likelihood estimation included in the AMOS statistical software (Arbuckle, 2016). To understand the advantages of the maximum likelihood estimation approach (Enders, 2001; Hu, 1997) over other methods in handling missing data requires mentioning other techniques. Indirect methods addressing missingness include listwise deletion, pairwise deletion, and single imputations. These methods can be problematic and produce biased estimations with misleading results (Schafer & Graham, 2002). There are other methods—model-based and imputation methods based on multiple regression procedures; however, these have also shown limitations inappropriately influencing variance and covariance (Collins, Schafer, & Kam, 2001).

The maximum likelihood algorithm is the most widely used criterion in SEM (Crisci, 2012). It is an estimation technique in which the objective is to mathematically reproduce a covariance matrix of the observed variables by means of the model parameters (Crisci, 2012). In maximum likelihood estimation, the likelihood statistical ratio is used to compare a theoretically based model with one hypothesized to measure the distance in between, with resulting goodness-

of-fit measures that best represent the data (Arbuckle, 1996; Crisci, 2012), or to reach for likelihood-based inferences when data are missing (Rubin, 1996).

Estimates generated by maximum likelihood have shown in computer-simulated conditions evidence of consistency and efficiency. Collins and colleagues (2001) compared maximum likelihood performance under large amounts of missingness (i.e., 25% with a constant sample of 500 participants) with that of multiple imputation techniques and reported maximum likelihood had a superior performance in estimating the results. Arbuckle used sample sizes of 145 to 500 in his study and highlighted that maximum likelihood, given conditions of multivariate normal distribution and MAR missingness patterns, performed better than pairwise and listwise deletion strategies in dealing with missing data (Arbuckle, 1996; Hu, 1997). Maximum likelihood estimates are asymptotically unbiased and can reduce bias in the results even when MAR conditions have not been satisfied and even with large percentages (±50%) of missingness (Graham, 2003).

A Multigroup and Multilevel Approach

To address multiple cohorts modeling, the first step was to specify a growth measurement model for each of the two physical activity intensity trajectories examined in this study. The structural models were built based on evidence found in the literature regarding adolescent development, factors related to physical activity in adolescents, and evidence regarding specific dynamics in Latino youths. Factor loadings in the model were linked to the observed MPA and VPA annual data. After that exogenous predictors of change were added to determine their influence on two factors (1) the intercept and (2) the slope of physical activity. Factor loadings were fixed at the intercept at 1.00 with $SE = 0.00$ and the pace of change at the slope was set at 0,

1, 2, and 3 to indicate a unit higher of change for every one year, which facilitated determining the difference in between years.

Time was a predictor of change inherent to the developmental model. The models were initially run with no parameter constraints to fit all the cohorts (Byrne, 2010b) and individually tested to determine whether the models represented the data derived from each of the cohorts (Baer & Schmitz, 2000; Byrne, 2010b). Last, a test of invariance was conducted with multicohort data. The test invariance procedure and results are addressed later in this chapter.

The models assumed that the cohorts were from the same population, where growth factors' means, variances, and covariances were the same with no cohort effects; it also assumed that even if no data were missing, missing data were present due to the characteristics of the design. The database included four annual waves of responses with subsets of incomplete data. Some of the missingness was related to the research design, which assumed all data in the model were going to be collected at each wave (Duncan et al., 1996; Duncan, Duncan, Strycker, & Chaumeton, 2007). The measurement model of SEM defined relations between the observed and unobserved latent variables, and the structural component of SEM-defined relationships among only the unobserved latent variables (Byrne, 2013a).

Covariates of Physical Activity Development

In SEM, exogenous variables include independent variables and exert effects on other variables in the model. Endogenous variables include dependent variables that are affected by other variables in the model. However, in SEM models, independent variables may function as exogenous and endogenous. Exogenous variables in the models are allowed to covary, and results confirm the significance of the proposed relationships in a model built based on theoretical evidence or evidence found in the literature (Newman, Vance, & Moneyham, 2010).

In the models for this study, age was examined as an intraindividual characteristic reflected in the passing of time and intrinsic in the growth curve. Participants were self-reported Latino. Therefore, no specific variable for age or ethnicity were assigned in the models. Gender, parent's marital status, and family annual income were initially examined as exogenous covariates related to adolescent physical activity development in the models and maintained, thereafter, in the model to control for the effect of other potential predictors. Other exogenous predictors that covaried with physical activity intercept and slope factors in the models included variable measurements at time 1 and change scores from time 1 to time 4 of (perceptions of) physical appearance, athletic competence, social acceptance, global self-worth, and body weight. Ethnic identity, social connectedness, and parent–adolescent communication measured at time 1 and change scores were also included as covariates of physical activity development in Latino youths.

Duncan and colleagues (2007) provided the idea for using a change score of the covariate as a predictor of change at the slope in the model. Change scores were selected instead of cohort measures that were available for examining the covariates at the four time points because the use of each individual covariate in the latent growth curve (LGC) across time would have resulted in very complex models with a high probability of inflation of type I error rate (Bobko, 2001; Duncan et al., 2007). These change scores were calculated by subtracting the mean scores obtained in time 1 from the mean scores obtained in time 4.

The influence of the independent variables and change score variables comprised within behavior-specific cognitions and affects were analyzed in two steps: as perceptions about self and perceptions about others in relation with self before determining critical relationships and removing nonsignificant predictors from the models. By *critical relationships*, I mean that

although some of these variables may have not exerted a direct influence at the initial status and/or the rate of change of physical activity, their influence was associated to the internal product. Removing them from the models would have affected the influence of significant predictors in the VPA and MPA hypothesized models.

Hypothesized Relationships

The following hypotheses about Latino youths were tested:

(a) Group means for physical activity decrease throughout middle adolescence for males and females.

(b) Compared with girls, boys have more physical activity throughout middle adolescence.

(c) Adolescents in higher-income families are more physically active than adolescents in lower-income families.

(d) Adolescents living in households with married parents accumulate more vigorous physical activity than adolescents living in single-parent households throughout middle adolescence.

(e) Change scores of high body weight perceptions significantly predict more vigorous physical activity in males and females.

(f) Higher levels of change in physical appearance and athletic competence perceptions predict higher levels of moderate and vigorous physical activity.

(g) Higher levels of social acceptance and global self-worth exert a positive effect on moderate physical activity throughout middle adolescence.

(h) Higher levels of ethnic identity, social connectedness, and parent–adolescent communication predict higher levels of moderate physical activity in Latino male and female middle adolescents.

POWER ANALYSIS ON STRUCTURAL EQUATION MODELING

Conducting statistical power analysis to determine an adequate sample size is important to rigorous research using SEM. However, there has been no consensus on establishing a standard method for power analysis calculation (McQuitty, 2004; Riedl, Kaufmann, & Gaeckler, 2014). Through simulation studies, researchers have shown that, "with normally distributed indicator variables and no missing data, a reasonable sample size for a simple confirmatory factor analysis (CFA) model is about 150, and for multigroup models is 100 cases per group" (Wang and Wang, 2012, p. 391).

Although the literature on calculating power analysis for SEM provides rules of thumb for different scenarios—model complexity, study designs, data characteristics, degree of data multivariate normality, and existence of missing data—it is the model-based approaches and methods based on model-fit indices that have been the most used to estimate sample size on specific models (Wang & Wang, 2012). The following are the most salient methods to estimate statistical power on SEM: the MacCallum, Browne, and Sugawara method; the Satorra and Saris method; and the Monte Carlo simulations (Wang & Wang, 2012).

Monte Carlo based simulations (Byrne, 2013b) were run with different software (Preacher & Coffman, 2006) and with the support of an experienced statistical consultant at the Department of Statistics and Data Sciences at the University of Texas at Austin. It was determined that testing the associated moderate and vigorous physical activity model required the largest sample to examine the growth curve for both physical activity trajectories with gender as a time-invariant predictor of change. The simulation results indicated that a minimum sample size of 446 was required for RMSEA to achieve a power of .80, alpha of .05 with a null epsilon

of .05 and alternative epsilon of .01, with 22 degrees of freedom (Byrne, 2013b; Preacher & Coffman, 2006).

TESTING FOR COHORTS INVARIANCE

The null hypothesis for testing a multigroup invariance poses that the covariance structures across the groups are equivalent (Byrne, 2013a). If the null hypothesis cannot be rejected, then the cohorts are considered to have equivalent covariance structures. Therefore, the objective of this test was to determine whether the models were noninvariant and to find the location of any noninvariance in the structure (i.e., factor loadings, covariance). Noninvariance is determined by the statistically significant difference in value between the chi-square with degrees of freedom of a *configural (baseline) model* and those of other models in which equality constraints have been imposed on particular parameters (Byrne, 2010a, p. 221). Testing for invariance among the cohorts permits identifying cohort differences related to factor loadings and covariances. These differences are important in reaching for conclusions about a longitudinal study that includes cohort sequential data (Duncan, Duncan, Strycker, & Chaumeton, 2007).

A multigroup invariance is an important step in further validating the results of a study using data from multiple groups (Duncan et al., 2007). To run this test, it was required identifying a configural model in which limited constraints were imposed to represent longitudinal data that was best in explaining the developmental growth curve. It also required that using only the same number of factors, that the factor-loading pattern be the same across groups (Byrne, 2010a, p. 208), and those constraints on the structure of the model be simultaneously applied. The fit of the configural model became the baseline measurement against which the measurements of other cohorts and the constrained model were compared (see Table 5 and Table 6).

Table 5

Invariance Test: MPA Model Fit

Model Description	X^2	*df*	$X^2\Delta$	Df Δ	ρ <.05
Hypothesized MPA model: 4-cohort free of constraints	94.18	72			
MPA model with all parameters constrained equally	122.03	114	27.85	42	.95

Table 6

Invariance Test: VPA Model Fit

Model Description	X^2	*df*	$X^2\Delta$	Df Δ	ρ <.05
Hypothesized VPA model: 4-cohort free of constraints	266.17	72			
VPA model with all parameters constrained equally	300.20	120	34.03	48	.95

These tests were run one at a time. The test invariant results for the models were not statistically significant; therefore, the cohorts were considered to have equivalent covariance structures.

LATENT GROWTH CURVE MODELS FOR TESTING PHYSICAL ACTIVITY OVER TIME

A latent growth curve was used to estimate moderate and vigorous trajectories of youth physical activity. Measurement models (initial) for MPA and VPA were built in similar fashion (Figure 2) and tested independently from each other. The linear growth with two latent factors was set to estimate the pertinent activity trajectory. Squares in the pictorial model represent observed variables—in this case, annual measurements. Each observed variable is linked to its respective error measurement, represented by the small circles. The larger circles depict unobservable or latent variables. One of these circles represents the intercept, or information concerning the mean and variance of individual intercepts, which was set as constant for any individual over time (Byrne, 2010b). The other circle represents the slope, or information concerning the mean and variance of the slope across the sample, or the trend of an individual's

trajectory formed by the repeated measures. The factor loadings of the intercept were fixed at 1, while for the slope these were incrementally fixed from 0 to 3 to represent a linear growth trend (Figure 2). A covariance or a double-headed arrow estimates the relationship between the slope and intercept. Trajectories shaped by the factor loadings and link to the slope used physical activity data derived from 8 response categories of activity frequency. Model testing was evaluated with goodness-of-fit indicators before interpreting the results.

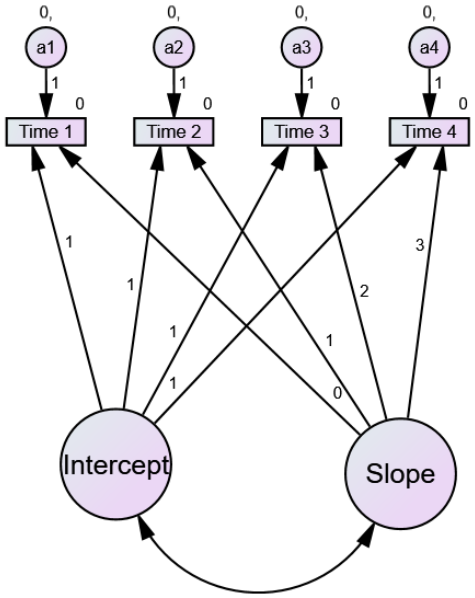

Figure 2. Measurement model.

Research Question 1

What are the effects of gender, family annual income, and parent's marital status on the physical activity trajectories—moderate and vigorous—of Latino adolescents as they move from grade 9 to grade 12?

Addressing question 1 involved testing structural models, one with data for MPA (Figure 3) and the other with data for VPA (Figure 4).

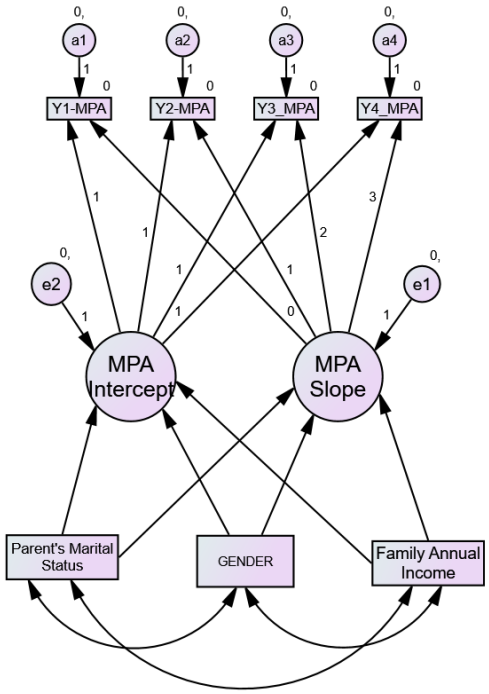

Figure 3. Gender, parent's marital status, and family annual income as predictors of moderate physical activity over time.

Gender, parent's marital status, and family annual income represented exogenous factors added to the initial model as predictors of change. A covariance or double-headed arrow linked

the predictors as covariates in the structural model. The slope and intercept were endogenous factors on which the predictors exert influence. Residuals (e1, e2), linked to the intercept and to the slope are unobserved variables that represent an error in the prediction of endogenous from exogenous factors (Byrne, 2010).

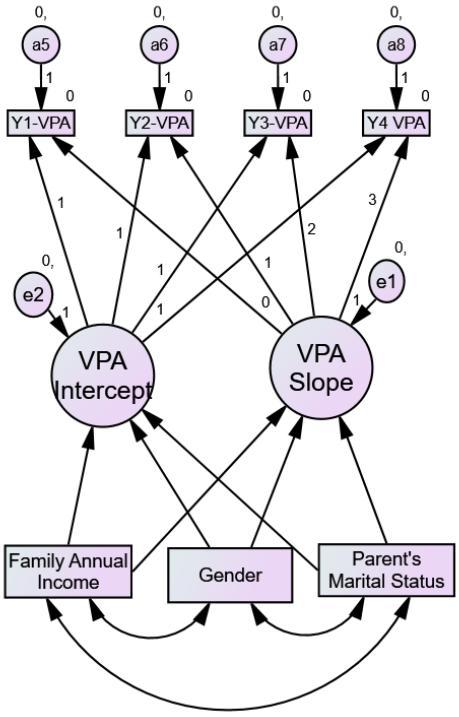

Figure 4. Gender, parent's marital status, and family annual income as predictors of vigorous physical activity over time.

Research Question 2

What perception covariates explain change in the moderate and vigorous physical activity trajectories between female and male Latino middle adolescents?

Addressing question 2 included testing two structural models for MPA (Figure 5 and Figure 6) and two structural models for VPA (Figure 7 and Figure 8). In Figure 5 and Figure 7, the covariates were time 1 measurements of the constructs.

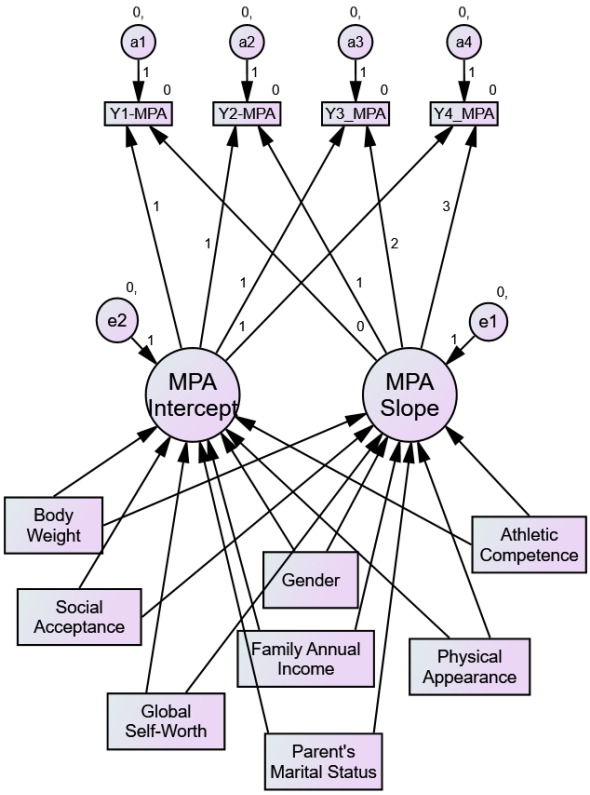

Figure 5. Perception time 1 covariates of moderate physical activity intercept and slope controlling for gender, family annual income, and parent's marital status.

Gender, family annual income, and parent's marital status were kept as control variables. Covariance among predictors is not shown in the figures. Change scores, time 4 minus time 1, of selected perceptions were covariates of only the slope in the pertinent structural models (Figure 6 and Figure 8). The fit of each model was evaluated for adequacy before interpreting the results.

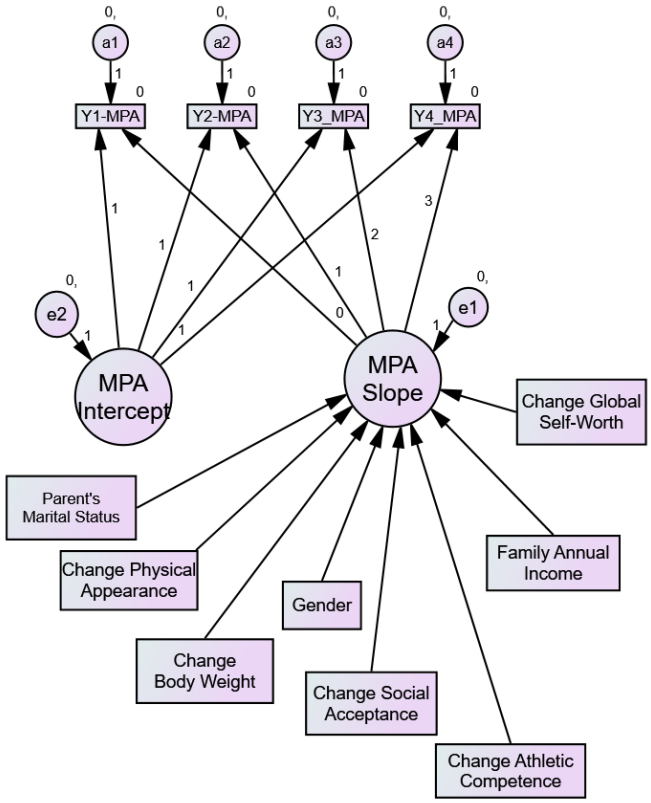

Figure 6. Change scores perception covariates of moderate physical activity slope controlling for gender, family annual income, and parent's marital status.

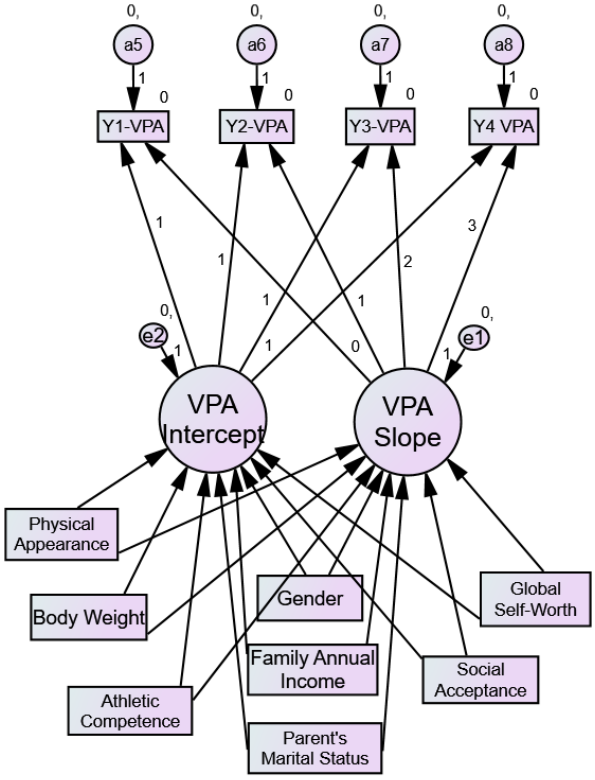

Figure 7. Perception time 1 covariates of vigorous physical activity intercept and slope controlling for gender, family annual income, and parent's marital status.

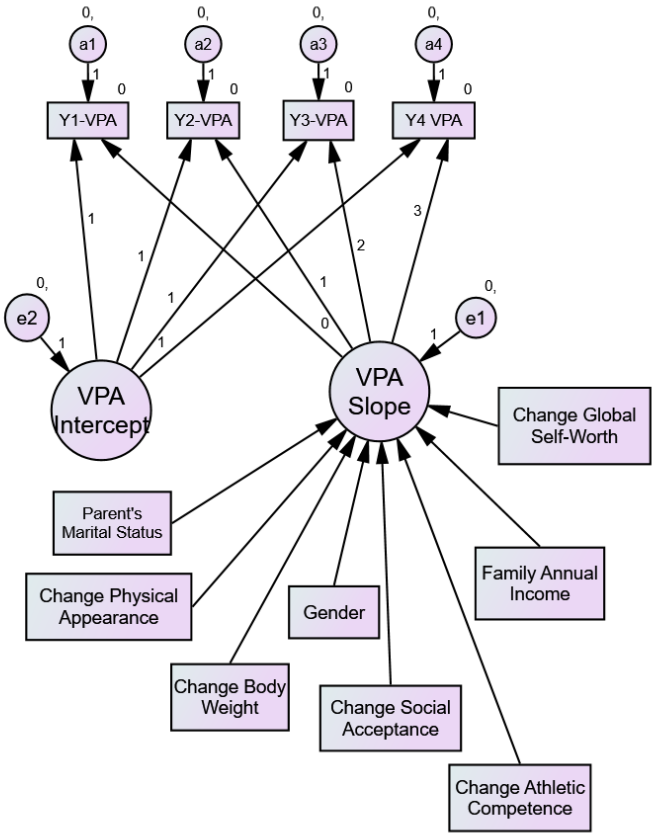

Figure 8. Change scores perception covariates of vigorous physical activity slope controlling for gender, family annual income, and parent's marital status.

Research Question 3

What effects do ethnic identity, parent–adolescent communication, and social connectedness have on the moderate and vigorous physical activity trajectories in Latino middle adolescents?

Addressing question 3 included testing two structural models for MPA (Figure 9 and Figure 10) and two structural models for VPA (Figure 11 and Figure 12). In Figure 9 and Figure 11, the covariates were time 1 measurements of the constructs.

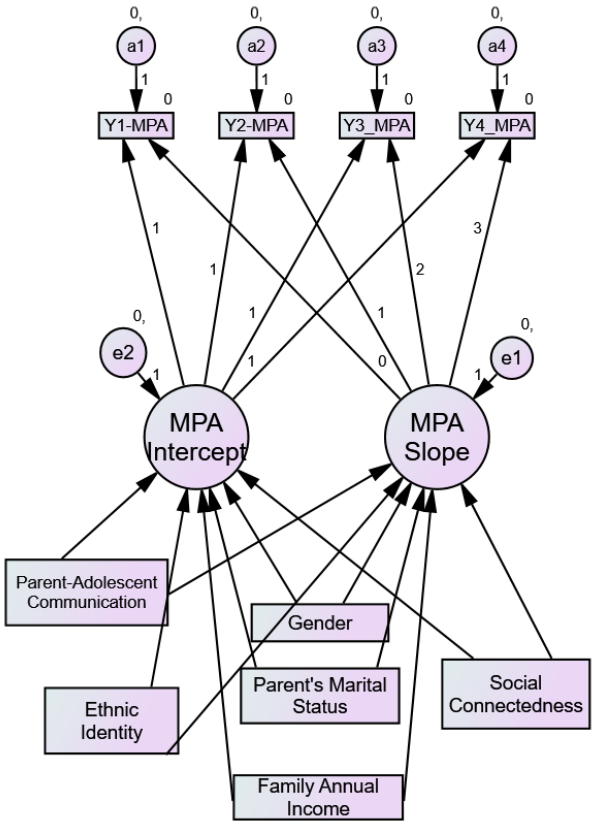

Figure 9. Social time 1 covariates of moderate physical activity intercept and slope controlling for gender, family annual income, and parent's marital status.

Models were tested controlling for gender, family annual income, and parent's marital status. Covariance among predictors is not shown in the figures. Change scores, time 4 minus time 1, of selected social variables were covariates of only the slope in the pertinent structural models (Figure 10 and Figure 12). The fit of each model was evaluated for adequacy before interpreting the results.

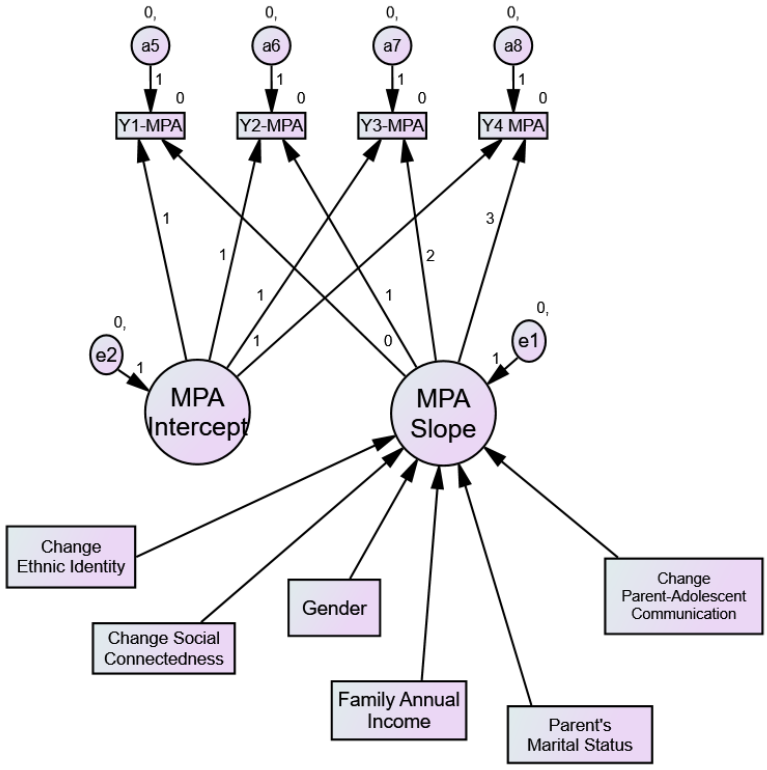

Figure 10. Change scores social covariates of moderate physical activity slope controlling for gender, family annual income, and parent's marital status.

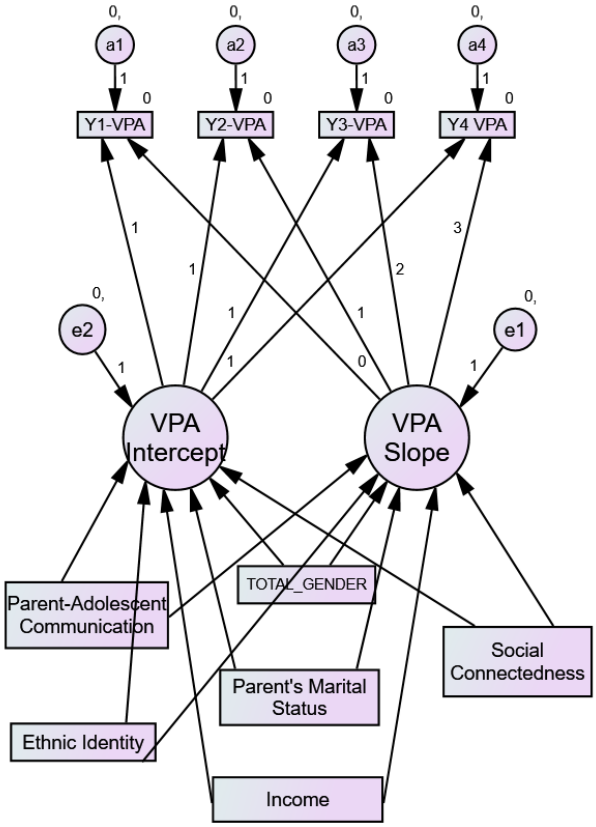

Figure 11. Social time 1 covariates of vigorous physical activity intercept and slope controlling for gender, family annual income, and parent's marital status.

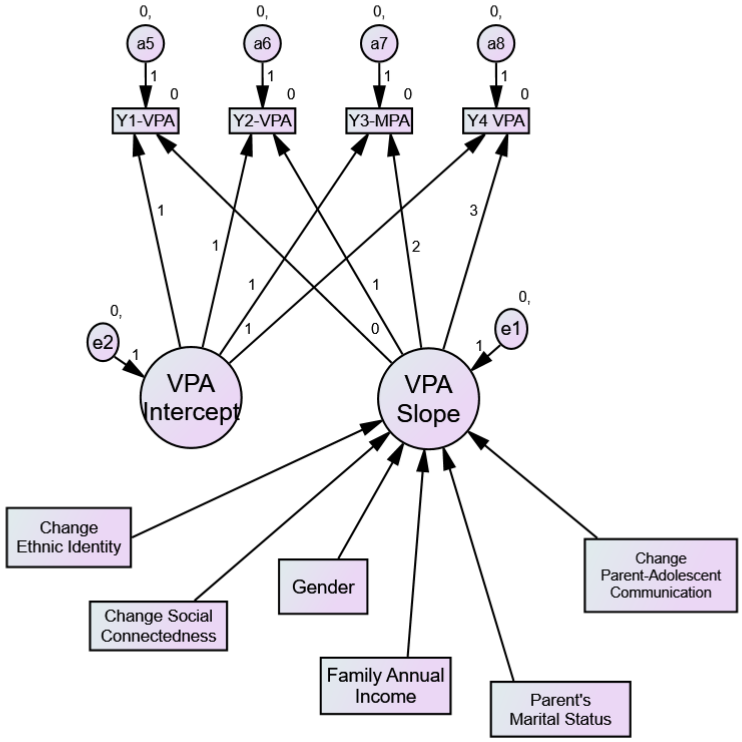

Figure 12. Change scores social covariates of vigorous physical activity slope controlling for gender, family annual income, and parent's marital status.

Research Question 4

Comparing the means, variance, and covariance of moderate and vigorous physical activity trajectories in a developmental model that incorporates them, what are the relationships among these trajectories in Latino middle adolescents? What is the effect of gender in an associative physical activity model in Latino middle adolescents?

Addressing question 4 included testing a measurement model that incorporated moderate and vigorous physical activity trajectories (Figure 13) and a structural model with gender as a time predictor of physical activity change (Figure 14).

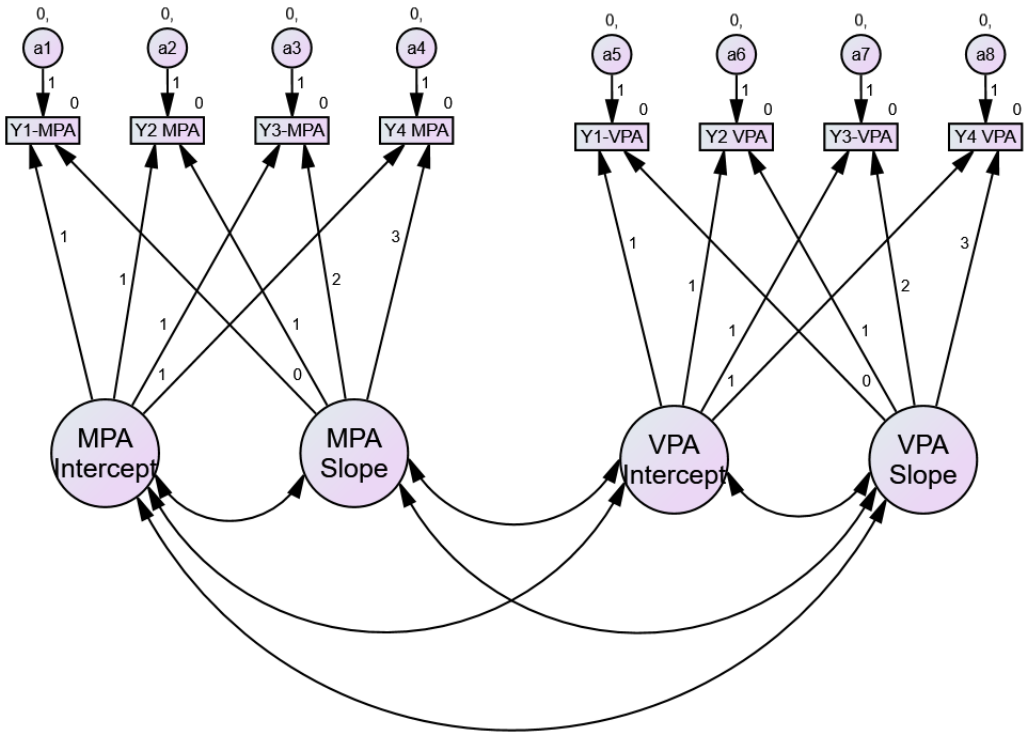

Figure 13. Associative physical activity measurement model.

Initial model testing included multiple covariances among intercepts and slopes. Fit indicators were examined for adequacy before testing the model with gender as a predictor of change in physical activity. Nonsignificant covariates were removed from the model in Figure 13. Results were interpreted after a satisfactory goodness of fit.

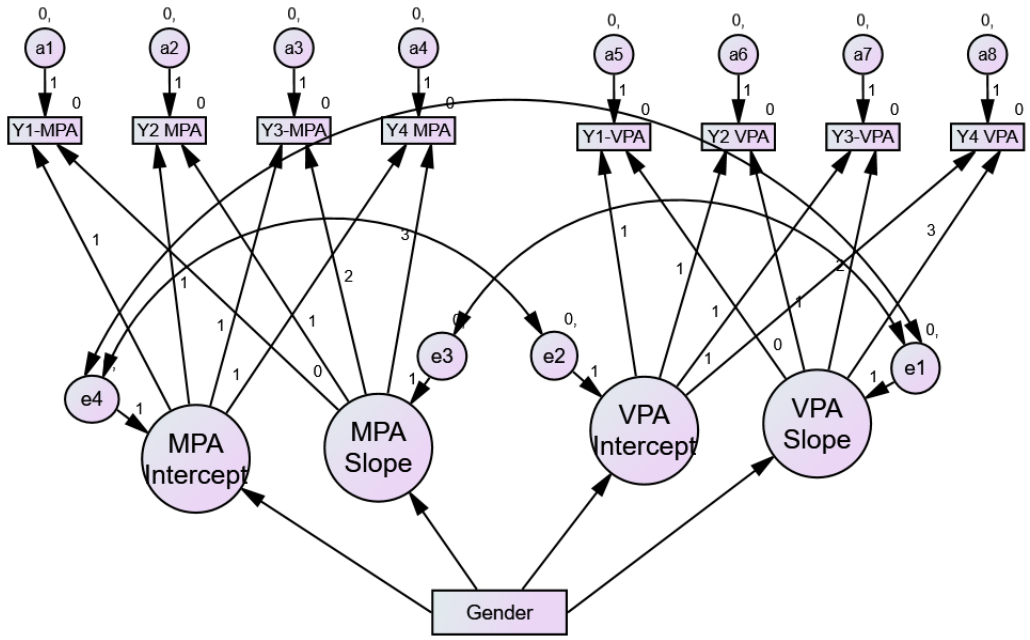

Figure 14. Associative physical activity model with gender as time invariant predictor of change.

Each model was carefully evaluated for goodness of fit between the hypothesized model and the data collected from the sample. Five indexes using established critical values, as shown in Table 7, were used to evaluate the models (Schreiber, Nora, Stage, Barlow, & King, 2006). However, for practical purposes, only chi-square with *p* value, CFI, and RMSEA with 90% confidence interval were reported.

Table 7

Cutoff Critical Values for Model Fit Indices

Fit Indices	Critical Values
Chi-square—X^2	$p > .05$, or nonsignificant
Predictive fit chi-square—CMIN/DF	Ratio of X^2 to $df \leq 2$–3, useful for model trimming
Comparative Fit Index (CFI)	$\geq .95$ for acceptance
Tucker Lewis Index (TLI)	$\geq .95$ can be $0 > TLI > 1$ for acceptance
Root mean square error of approximation (RMSEA)	< .06 to .08 with 90% confidence interval

Summary

The study was a secondary analysis of incomplete data. The research design was cohort-sequential, observational, and longitudinal. Seven valid and reliable instruments were used, including 3 single-item measurements. The conceptual framework was Pender's Health Promotion Model that allowed for the organization of the dependent and independent variables in three broad categories: behavior outcome, individual characteristics and experience, and behavior-specific cognitions and affects. It also helped in the examination of changing relationships of various constructs in adolescents over time. The sample comprised 628 self-reported Latino adolescents age 14 to 18. The methodology included multimethod strategies for

the statistical analysis of data. Full information maximum likelihood and latent growth curve SEM modeling were the methods used to address missing data.

The study examined the trajectory of moderate and vigorous physical activity independent from each other and in an associative model with gender as a predictor of change. The effects of selected variables on Latino youths' physical activity when adolescents were in grade 9 and as they moved to grade 12 were evaluated. Specifically, this study explored how developing aspects, such as (perceptions of) physical appearance, body weight, athletic competence, social acceptance, and global self-worth, as well as ethnic identity, social connectedness, and parent–adolescent communication, structurally exert influence on physical activity over time. The results of model testing and other analyses are addressed in Chapter 4.

Chapter 4: Results

In this chapter, the results of this study are presented. Latent growth structural equation modeling was used for the analyses of cohort-sequential longitudinal secondary data. The purpose was to examine how developing aspects in middle adolescence, such as ethnic identity, self-perceptions (of physical appearance, body weight, athletic competence, social acceptance, and global self-worth), social connectedness, and parent-adolescent communication exerted influence on the adolescents' physical activity over time. First, a preanalysis of data is addressed before presenting the characteristics of the sample and of the variables. Individual models for vigorous and moderate physical activity were specified, and tested separately, before an associative model was specified. Last, research questions and hypothesized relationships were settled.

Preanalysis: Missing Data

Available sample data displayed diverse patterns of completeness. Akin to cohort-sequential design, individuals' participation in this study was more flexible than in a true longitudinal study as this can allow for the inclusion of data collected from only a single time point (McArdle & Hamagami, 1992; Schaie & Baltes, 1975). At time 1, the sample had participants of varying ages and school grades who, in most cases, were followed annually at 3 additional time points. In some other cases, participants were measured at fewer than 3 time points depending upon school grade and age of the participant at enrollment. For example, if a youth was aged 17 at enrollment, this participant was most likely followed up for one more annual measurement as most participants graduated from high school by age 18. Therefore, older participants were more likely than others to contribute to the study with a shorter term of longitudinal data. In addition, it was possible that each year new students were added as others

dropped out or as they moved out of the school district. This study included data from four cohorts that together simulated a large longitudinal study (N = 628).

Compared with the overall sample (N = 628), the data collected at time 1 (n = 446; 71%) represented the most complete data available for analysis. Conversely, large missing data percentages (29%) were related to the design structure (Cole et al., 2001; Duncan & Duncan, 1994; McArdle & Hamagami, 1992), whereas smaller varying percentages were due to item nonresponse (see Table 8). In addition, except for time 1, data collected at other time points include missingness derived from attrition. *Attrition* refers to the gradual reduction of participants, who may have continued attending school but did not return to be measured at the next annual measurement or at any of the other subsequent time measurements. Therefore, in this study, having complete data at time 1 implied that a participant had been measured and data stored for each of the 55 variables that were required, including parent's information about family annual income and parent's marital status, which were measured only at enrollment. At subsequent time points, participants were measured for only 53 variables, thus having complete data meant having values stored for each of the 53 variables.

Growth curve models, when underlying assumptions of missing mechanisms are met, can be estimated even in the presence of a variety of complexities, including various cohorts of participants enrolled at different time points in the life of the study and large percentages of missing data (Curran, Obeidat, & Losardo, 2010; McArdle, 2009). In this study, information regarding the status of the data completeness is displayed in Table 8. Accordingly, the growth curve was built by summing the individual data contributions of each case. Participants with absolutely no missing data total 113, or 18% of the overall sample. In a traditional longitudinal design, these data would represent a perfectly identified path with a complete set of

measurements not only at enrollment but also at each subsequent measurement of the time trajectory. The presence of a perfectly repeated measure dataset nested within this 18% percent of the sample represented a sizeable portion of direct measurement that helped identify a linear trajectory in the models. However, in research that uses repeated measures, not being measured at each instance or at all occasions is commonplace (Allison, 1987; McArdle, 2009).

Missing data are a rule rather than an exception in most quantitative research, and participants of longitudinal studies are likely to miss various measures on a survey at time 1 but answer the rest at other time measurements (Curran et al., 2010; Schafer & Graham, 2002). Although in this study some participants contributed measurements at one or two rather than all four time points, their data also helped with identifying a linear trajectory in the models. Attrition from time 1 to time 4 was 23%. This was estimated by subtracting the aggregate of recruitment percentage of participants at time 1 who were not measured 4 years later, considering all participants at time 1.

Recapping from Chapter Three, in which the methodology of this study was discussed, this study fit the characteristics of the available data set by using structural equation models (SEM) and maximum likelihood (ML) methods for the statistical analysis. These were activated through AMOS statistical software (Arbuckle, 2016). The missing data at the item level were addressed considering aspects such as the proportion of missing data, the patterns of missing data, and the missing data mechanisms (Dong & Peng, 2013).

Table 8

Data Completeness Status at Time 1

Variable	Number of items*	Cases					
		Valid (*N* = 446)		Missing		Total	
		N	%	N	%	N	%
Age	1	445	70.9	183	29.1	628	100.0
Gender	1	446	71.0	182	29.0	628	100.0
Social Acceptance	5	446	71.0	182	29.0	628	100.0
Athletic Competence	5	446	71.0	182	29.0	628	100.0
Physical Appearance	5	445	70.9	183	29.1	628	100.0
Global Self-Worth	5	446	71.0	182	29.0	628	100.0
Ethnic Identity	14	434	69.1	194	30.9	628	100.0
Social Connectedness	10	434	69.1	194	30.9	628	100.0
Parent–Adolescent Communication	4	432	68.8	196	31.2	628	100.0
Body Weight	1	433	68.9	195	31.1	628	100.0
Moderate Physical Activity	1	435	69.3	193	30.7	628	100.0
Vigorous Physical Activity	1	436	69.4	192	30.6	628	100.0
Family Annual Income	1	403	64.2	225	35.8	628	100.0
Parent's Marital Status	1	446	71.0	182	29.0	628	100.0
Total	55					628	100.0

*The values and percentages were averaged for multi-item variables

Sample

The initial dyad sample comprised 628 self-reported Latino middle adolescents—359 females (57%) and 269 males (43%)—and one of each of their parents. In this study, parents contributed information only at enrollment. Youths who participated in this study were distributed among four cohorts as follows: cohort A included 142 (23%) participants, cohort B 181 (29%), cohort C 165 (26%), and cohort D 140 (22%). At time 1, participants had a mean age of 14.7 years (SD = 0.63), with most of them aged between 14 (38.7%) and 15 (52.8%). Only a few reported being 16 years old (8.1%) and 17 years old (0.4%).

An estimated 567 (90%) parents reported their family annual income (*Median* = US$30, 001–$US40, 000), including 123 parents (22%), who indicated that their annual income was

under US$20,000. Most of the parents in the sample (56%) noted that their family's annual income was US$40,000 or less, and a few (6%) marked it as more than US$100,000. Regarding their marital status, 590 (94%) parents reported on this item. Most parents (n = 405, 64.5%) indicated that they were married, and 223 (35.5%) indicated that they were not married.

Available Data on Physical Activity

Available data on moderate physical activity (MPA) and vigorous physical activity (VPA) were closely examined for completeness. MPA and VPA data at time 1 were available for 435 (69.3%) and 436 (69.4%) participants, respectively; for 455 (72.5%) and 456 (72.6%), respectively, at time 2; for 434 (69.1%) and 434 (69.1%), respectively, at time 3; and 383 (61%) and 382 (60.8%), respectively, at time 4. A total of three subjects had incomplete data on one or more of the behavior outcomes of interest and could not be included in the present analyses (Duncan & Duncan, 1994; Schaffer & Graham, 2002), leaving a sample of 625 adolescents. Additionally, a few more cases in each cohort were removed from the analyses: 4 participants from cohort A, 4 participants from cohort B, and two participants from cohort D due to nonresponse on the behavior outcome at any of the time points (Allison, 1987; Arbuckle, 1996; Dong & Peng, 2013). This resulted in a final sample of 615 Latino adolescents: 356 females (57.9%) and 259 males (42.1%).

Analysis

Descriptive Statistics for Study Variables. Means and standard deviations for each of the main variables, at the four time points, were estimated, and the results are displayed in Table 9. Also, assumptions to determine the validity of one-way repeated measures ANOVA were met in order to determine the statistical significance of the trend line for each of the independent variables. These assumptions included between-subjects independence, equality of variance, sphericity assumption, and multivariate normality (Stevens, 2012). Greenhouse-Geisser epsilon was the corrective measure used in a few instances when Mauchly's sphericity test was significant ($p < .05$).

One-way repeated measures ANOVA showed significant trend lines in age, ethnic identity, physical appearance, and vigorous physical activity, as noted in Table 9. Significant findings included results of partial eta squared (Richardson, 2011) to estimate the effects accounted for by the dependent variable unexplained by the independent variable in this longitudinal analysis. The results from examining physical activity as a behavior outcome, including patterns and prevalence in this sample of middle adolescents at initial status, are addressed later in this chapter.

The mean ethnic identity scores for each annual measurement are noted in Table 9. At the initial status, Latino middle adolescents exhibited high scores of ethnic identity ($M = 2.86$, $SD = 0.56$); however, as time passed, a significant decline in group means became evident ($F(3, 720) = 5.50$, $p < .001$, Greenhouse-Geisser epsilon adjustment) with each annual measurement. The ethnic identity mean scores formed both a significant linear trend to the data ($F(1,241) = 6.97$, $p = .009$) and a significant quadratic trend ($F(1,241) = 8.36$, $p = .004$), with a partial eta squared of .034; that is, 3.4% of the variance effect was accounted for by ethnic identity and its associated

error variance. The combined trend line included a negative slope, reaching a lower level (M = 2.71; SD = 0.61) as adolescents entered the eleventh grade, which, in turn, resurged (M = 2.76; SD = 0.59) as participants exited the study. Further analysis unveiled that any gender differences in ethnic identity development in these youths ($F(1,240) = 0.37$, $p = .543$) was trivial.

Table 9

Descriptive Statistics of Main Variables over Time

Variable	Range	N[a]	Time 1			Time 2			Time 3			Time 4		
			M	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*M*	*SD*	*95% CI*	*M*	*SD*	*95% CI*
Age (years)***	14–18	235	14.65	0.61	14.57, 14.72	15.46	0.65	15.38, 15.54	16.24	0.58	16.16, 16.31	17.12	0.57	17.05, 17.19
Ethnic Identity**	1–4	242	2.86	0.56	2.79, 2.93	2.77	0.59	2.69, 2.84	2.71	0.61	2.63, 2.79	2.76	0.59	2.68, 2.83
Social Connectedness	1–4	246	3.12	0.63	3.04, 3.20	3.11	0.59	3.04, 3.18	3.16	0.54	3.09, 3.23	3.19	0.56	3.12, 3.26
Parent–Adolescent Communication [b]	1–4	241	2.85	0.67	2.76, 2.93	2.87	0.65	2.79, 2.96	2.94	0.62	2.86, 3.02	2.91	0.63	2.83, 2.99
Physical Appearance***	1–4	237	2.67	0.76	2.57, 2.77	2.77	0.73	2.68, 2.87	2.78	0.74	2.69, 2.88	2.88	0.68	2.79, 2.96
Athletic Competence	1–4	238	2.53	0.76	2.43, 2.63	2.54	0.78	2.44, 2.64	2.55	0.78	2.45, 2.65	2.60	0.83	2.49, 2.70
Social Acceptance	1–4	238	3.06	0.54	2.99, 3.13	3.09	0.56	3.02, 3.16	3.06	0.56	2.99, 3.13	3.07	0.58	2.99, 3.14
Global Self-Worth	1–4	238	3.05	0.67	2.97, 3.14	3.10	0.61	3.02, 3.18	3.09	0.65	3.01, 3.18	3.16	0.61	3.08, 3.24
Body Weight (perceptions)	1–4	245	3.31	0.73	3.22, 3.41	3.36	0.72	3.27, 3.45	3.35	0.72	3.26, 3.44	3.34	0.77	3.24, 3.44

Table 9 (continued)

Moderate Physical Activity (MPA) of 30 Minutes/Day (days per week)	0–7	248	1.97	2.24	1.69, 2.25	1.99	2.25	1.71, 2.27	1.98	2.34	1.69, 2.28	1.74	2.17	1.47, 2.01
Vigorous Physical Activity (VPA) of 20 Minutes/Day (days per week)***	0–7	248	3.15	2.49	2.84, 3.46	3.06	2.44	2.76, 3.37	2.73	2.37	2.44, 3.03	2.65	2.38	2.35, 2.95

*$p < .05$; **$p < .01$; ***$p < .001$ for linear trend (adjustment for multiple comparisons: Bonferroni).
[a] Valid sample size for trend line estimation.
[b] Parent–adolescent communication (frequency).

Also at initial status, participants reported, on a range from 1 to 4, high levels of social connectedness (M = 3.12; SD = 0.63), which gradually increased at the ensuing three time points to reach the highest estimate (M = 3.19; SD = 0.56) as adolescents exited the study; however, the overall upward trend for the sample was nonsignificant ($p > .05$). Mean scores of social connectedness at the four time points were significantly correlated among themselves, with Pearson's coefficients that fluctuated between $r(318) = .49$, $p < .001$ and $r(338) = .56$, $p < .001$, suggesting steady, positive relationships in social connectedness development over time. Consistent with high trends in social connectedness at enrollment, this group of adolescents reported having frequent communication with their parents (M = 2.85; SD = 0.67) regarding a job or education after high school, personal problems or concerns, teachers or classes in school, and things that the adolescents enjoy; and this communication increased in frequency (M = 2.91, SD = 0.63) as adolescents became older. However, the linear upward trend was nonsignificant ($p > .05$).

The participants' mean scores in the What I Am Like (WIAL) subscales of social acceptance and global self-worth at different time points formed a steady nonsignificant ($p > .05$) trend over time, with fluctuating scores above 3 on a range of 1 to 4. At enrollment, Latino youths' perceptions on athletic competence and physical appearance received the lowest measurements of the four WIAL subscales used in this study, as shown in Table 9. Participants reported their perception on athletic competence, on a range from 1 to 4, to be around 2.53 (SD = 0.76), and their mean physical appearance was estimated as 2.67 (SD = 0.76).

Physical appearance was the only measurement of the WIAL subscales that, over the four years , showed significant group mean differences ($F(3, 708) = 7.90$, $p < .001$, Greenhouse-Geisser epsilon adjustment). At initial status, participants' self-perceptions on physical appearance had a mean score of 2.67 ($SD = 0.76$) on a range from 1 to 4, and it consistently increased to reach an average score of 2.88 ($SD = 0.68$) when participants were attending twelfth grade. The findings also uncovered a significant linear trend ($F(1, 235) = 17.21$, $p = .001$) for the group, with a partial eta squared value of .068, suggesting that 6.8% of the variance effect was accounted for by (self-perceptions on) physical appearance and its associated error variance.

Further analysis revealed significant gender differences in mean scores of physical appearance ($F(3, 705) = 5.99$, $p < .001$, Greenhouse-Geisser epsilon adjustment) derived from annual measurements and a significant interaction between physical appearance and gender ($F(1, 235) = 5.09$, $p = .025$), with a partial eta squared of .021, suggesting that 2.1% of the variance effect was explained by the physical appearance and gender interaction. Averaging across the four time points, the results showed that female participants rated their physical appearance ($M = 2.67$, $SE = 0.05$, 95% CI [2.57, 2.76]) lower than the males ($M = 2.96$, $SE = 0.06$, 95% CI [2.83, 3.08]) in the sample.

Participants reported on average, and over time, high scores regarding body weight (perceptions) regardless of actual weight measures. Annual group mean differences were nonsignificant ($F(3, 732) = 0.63$, $p = .58$, Greenhouse-Geisser epsilon adjustment). At initial status, on a range from 1 to 4, participants rated their body weight as overweight ($M = 3.31$, $SD = 0.73$) and maintained consistent mean scores above 3

throughout the annual measurements (M = 3.34, SD = 0.77). Participants' body weight (perceptions) showed a nonsignificant quadratic trend (F(1, 244) = 1.45, p = .23).

On average, participants reported low levels of moderate physical activity as they entered the study (M = 1.97, SD = 2.24) and as they exited at time 4 (M = 1.74, SD = 2.17). Group mean over time differences in MPA frequency were nonsignificant ((F(3, 741) = 0.94, p = .42, Greenhouse-Geisser epsilon adjustment). The trend line in MPA was also nonsignificant (F(1, 247) = 1.58, p = .21). Gender differences were evaluated as well. Averaging across the four time points, females reported lower MPA frequency (M = 1.83, SE = 0.12, 95% CI [1.59, 2.07]) than males (M = 2.07, SE = 0.15, 95% CI [1.77, 2.37]); however, these gender differences in MPA frequency were nonsignificant (F(1, 246) = 1.56, p = .21).

Conversely, there were significant group mean differences in vigorous physical activity (F(3, 741) = 4.54, p = .004, Greenhouse-Geisser epsilon adjustment), including a significant linear trend (F(1, 247) = 10.61, p = .001). Although group VPA variability was high considering the large standard deviations reported in Table 9, group size for the four cohorts was equivalent, a factor that protects against type I error (Stevens, 2012, p. 57). Gender differences in VPA were also examined. There was a significant interaction between VPA and gender (F(3,738) = 3.00, p = .03, Greenhouse-Geisser epsilon adjustment) with a partial eta squared of .012; indicating that 1.2% of the effects was explained by the interaction of VPA and gender and its associated error. Significant mean annual differences in VPA frequency by gender (F(3, 738) = 3.82, p = .01, Greenhouse-Geisser epsilon adjustment) were present in the sample. Averaging VPA measurements

over time, female participants reported lower VPA frequency (M = 2.67, SE = 0.15, 95% CI [2.38, 2.95]) than males (M = 3.28, SE = 0.19, 95% CI [2.92, 3.66]).

In sum, the characteristics of the variables throughout middle adolescence suggested that participants underwent dynamic development in multiple domains. Gender, family annual income, and parent's marital status were control variables in the latent growth curve (LGC) models tested in this study. The results of their effects on participants' physical activity trajectories are addressed later in this chapter. Other covariates of the intercept and slope factors in the hypothesized models included mean measures at time 1 of physical appearance, athletic competence, social acceptance, global self-worth, body weight, ethnic identity, social connectedness, and parent–adolescent communication. Covariates of only the slope in the LGC models were change scores in these variables, which derived from a change in value from time 1 to time 4 (see Table 10). Standard deviations for the change scores ranged from 0.58 and 0.73, indicating considerable variation among participants. On average, participants experienced the greatest gain in (self-perceptions) physical appearance (M = 0.21, SD = 0.72) and global self-worth (M = 0.11, SD = 0.67) and the greatest decline in ethnic identity (M = –0.100, SD = 0.56). Change scores in ethnic identity and physical appearance were statistically significant ($p < .05$).

Table 10

Means, Standard Deviations, and Confidence Intervals of Covariates—Change Scores

Change Scores (Time 4 minus Time 1)	N	Mean (SD)	95% CI
Athletic Competence Change	238	.06 (.68)	–.05, .18
Physical Appearance Change	237	.21 (.72)***	.08, .33
Social Acceptance Change	238	.01 (.58)	–.07, .09
Global Self-Worth Change	238	.11 (.67)	–.01, .22
Body Weight Change	245	.02 (.68)	–.09, .14
Ethnic Identity Change	242	–.10 (.56)*	–.20, –.001
Social Connectedness Change	246	.06 (.61)	–.04, .17
Parent-Adolescent Communication Change	241	.06 (.73)	–.06, .19

The mean difference is significant *$p < .05$; **$p < .01$; ***$p < .001$

Correlations among Study Variables. The study variables were also correlated to estimate the relationships among all of them. The analyses included correlations among variables with continuous values (see Table 11) and correlations between these and variables with dichotomous values (see Table 12). VPA and MPA showed different statistically significant associations from each other; distinctly, while VPA displayed significantly moderate associations with all of the measurements of WIAL subscales, MPA was only fairly related to parent-adolescent communication $r(435) = .11$, $p < .05$. All the variables included in the WIAL subscales were significantly correlated among themselves; however, their relationships were not strong (Table 11).

The strongest relationship on the correlation matrix was between the scores of global self-worth (self-esteem) and physical appearance $r(435) = .60$, $p < .001$. Physical appearance and athletic competence had the largest numbers of pair correlations on the matrix, with six of them each. Being a male was significantly associated with high scores of athletic competence $r_{pb}(435) = .27$, $p < .001$. Only one significant association was found between parent's marital status and the study variables. Having married parents was weakly associated with high scores of ethnic identity $r_{pb}(435) = .10$, $p < .05$. A chi-square–based statistic (result not shown on the tables) was computed between youths' gender and parent's marital status, resulting in a nonsignificant nominal association (Cramer's V = .02, $p = 65$).

Table 11

Correlations among Variables with Continuous Values at Time 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1											
2. Ethnic Identity	.01	1										
3. Physical Appearance	.04	.11*	1									
4. Athletic Competence	.03	.07	.40**	1								
5. Social Acceptance	.05	.16**	.39**	.27**	1							
6. Global Self-Worth	.03	.20**	.60**	.30**	.51**	1						
7. Social Connectedness	.09	.22**	.14**	.12*	.07	.24**	1					
8. Parent-Adolescent Communication	.04	.19**	.05	.17**	.04	.09	.37**	1				
9. Annual Family Income	.05	.01	.02	.00	–.08	–.00	–.07	–.07	1			
10. Body Weight	.07	.01	.32**	.27**	.14**	.22**	–.08	–.04	.01	1		
11. Vigorous Physical Activity	.08	.07	.22**	.39**	.20**	.23**	.08	.08	.04	.07	1	
12. Moderate Physical Activity	.02	.08	.02	.01	–.02	–.01	–.07	.11*	.08	.00	.24**	1

$P < .05$ * (2-tailed), $p < .001$** (2-tailed)

Table 12

Correlations between Continuous and Dichotomous Variables at Time 1

Variables	Marital Status (0) Not married (1) Married	Gender (0) Female (1) Male
Age	–.05	–.03
Ethnic Identity	.10*	–.05
Physical Appearance	.04	.25**
Athletic Competence	–.03	.27**
Social Acceptance	.02	.08
Global Self-Worth	.03	.26**
Social Connectedness	.03	.03
Parent-Adolescent Communication	.02	–.05
Family Annual Income	.05	.06
Body Weight (perceptions)	–.01	–.09
Vigorous Physical Activity	.03	.21**
Moderate Physical Activity	.08	.01

P <.05 * (2-tailed), *p* < .001** (2-tailed)

Physical Activity Prevalence at Time 1. The prevalence of MPA and VPA at time 1 was examined as noted in Tables 13 and 14, respectively. The prevalence of meeting MPA guidelines over the previous 7 days, as recommended prior to 2008 (Brener et al., 2004, p. 3), was lower (17.5 %) than meeting VPA guidelines (59.1%) at time 1. On average and proportionally, more girls (21%) than boys (15.7%) reported not participating in MPA or physical activities of 30 minutes that did not make them sweat or breathe hard on at least 5 days (Table 13). In contrast, 6 out of 10 participants met VPA guidelines at initial status, as recommended prior to 2008 (Brener et al., 2004, p. 3), with proportionally more girls (31.5%) than boys acknowledging their participation in at least 3 days of 20 minutes in physical activities that made them sweat and breathe hard (Table 14). No VPA participation (14.7%) was also proportionally more prevalent among girls than boys in this study.

Table 13

*Moderate Physical Activity Pattern at Time 1 (n = 433)**

Gender	Age	Moderate Physical Activity of the Past 7 Days	
Female		Did not participate in at least 30 minutes on at least 1 day *f* (%)	Participated in at least 5 days of 30 minutes[a] *f* (%)
	14	39	17
	15	41	21
	16	11	3
	17	0	0
total		90 (21.0)	41 (9.6)
Male			
	14	24	14
	15	39	18
	16	3	2
total		67 (15.7)	34 (7.9)
Total		**157(36.7)**	**75(17.5)**

*Estimated 45.8 % of the sample (not shown) did not meet the recommended [a] MPA guidelines at time 1. MPA levels in these adolescents were dispersed.

Table 14

*Vigorous Physical Activity Pattern at Time 1 (n = 433)**

Gender	Age	Vigorous Physical Activity of the Past 7 Days	
		Did not participate in at least 20 minutes on at least 1 day	Participated in at least 3 days of 20 minutes [a]
Female		***f* (%)**	***f* (%)**
	14	21	53
	15	35	71
	16	6	11
	17	1	0
total		63 (14.7)	135 (31.5)
Male			
	14	7	44
	15	10	69
	16	3	5
total		20 (4.7)	118 (27.6)
Total		**83 (19.4)**	**253 (59.1)**

*Estimated 21.5 % of the sample (not shown) did not meet the recommended [a] VPA guidelines at Time 1. VPA levels in these adolescents were dispersed.

Latent Growth Curve (LGC) Measurement Models. Hypothesized models were analyzed using the two-step approach (Byrne, 2010). The first step was testing a measurement model, and the second step included testing a structural model. Testing the first model without covariates was of prime importance as it allowed determining the extent to which the hypothesized model fit the data and whether the growth curve made up with multiple cohort data was tenable without modifications (Byrne, 2010; Duncan et al., 2007). The hypothesized latent growth curve (LGC) models for MPA and VPA were drawn in a similar fashion. Each had two latent factors (one intercept and one slope) and four observations representing annual VPA and MPA data. Each of the four factor loadings, linked to the intercept, was fixed at 1, indicating a constant pattern across time. The four factor loadings, linked to the slope, were fixed in increments that went from 0 to 4, delineating equivalent time points (annual measures) in a trajectory across time (Byrne, 2010). Each model was run independently.

Moderate Physical Activity Measurement Model. The initial fit for the hypothesized MPA model was χ^2 (5, N = 615) = 3.07, p = .689, comparative fit index (CFI) = 1.0, root mean square error of approximation (RMSEA) = .000 with a 90% CI [.000, .043]. Considering the nonsignificant p-value of the chi-square and the goodness of fit of the indexes, these results suggested a model that adequately fit the relationships among the observed data across time (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004). The observed MPA values loaded well on the MPA intercept and slope factors. The goodness of fit of the data to the model suggested that the MPA model was well specified, and no post-hoc modifications were needed.

The intercept and slope means and variances for the MPA model are displayed in Table 15. The MPA intercept mean was significantly different from 0 ($\beta = 2.10$, $p < .001$), indicating that on average, participants' initial MPA frequency was 2.10 days of 30 minutes per week. The mean of the MPA slope showed a nonsignificant decline in frequency ($\beta = -.053$, p = .231) over the 4-year trajectory (Table 15). The MPA variance at the intercept and slope were nonsignificant, suggesting that any intra-individual differences in MPA frequency or rate of change were trivial. The covariance between the intercept and the slope in the MPA model was nonsignificant ($\beta = 2.78$, $p = .078$), indicating that MPA frequency at initial status had no impact on the rate of MPA change over the 4-year period.

Table 15

Parameter Estimates for the Moderate Physical Activity Model without Covariates

	Estimates (β)	*SE*	*p* –value (2-tailed)
Means			
Intercept	2.10	0.09	.001
Slope	–0.05	0.04	.231
Variances			
Intercept	0.53	0.38	.159
Slope	–0.01	0.09	.943
Error1	4.67	0.49	.001
Error2	4.20	0.34	.001
Error3	3.57	0.31	.001
Error4	2.81	0.41	.001
Covariance			
Intercept-Slope	0.28	0.16	.078

Vigorous Physical Activity Measurement Model. The model fit for the initial hypothesized VPA model was χ^2 (5, N = 615) = 6.00, p = .306, CFI = .99, RMSEA = .018 with a 90% CI [.000, .061]. These results suggested that the hypothesized VPA model adequately fit the relationships among the observed data across time (Hu & Bentler, 1999; Marsh et al., 2004). The VPA values loaded well on the VPA intercept and slope factors. The measurement model was well specified, and no post-hoc modifications were implemented.

The intercept (β = 3.32, p = .001) and slope (β = –0.19 p = .001) means in the VPA model were statistically significant (Table 16). These findings revealed that, on average, the VPA frequency for the group was greater than 3 days of 20 minutes per week at initial status, and this frequency significantly decreased (–0.19) per year as participants moved from grade 9 to grade 12. The variance at the VPA intercept (β = 2.73, p = .001) was significant, indicating large intra-individual differences in VPA frequency at initial status; however, VPA variance at the slope was nonsignificant (β = 0.12, p = .194); that is, youths' differences in VPA frequency did not differ much in their rate of change. The covariance between the intercept and the slope in the VPA model was statistically nonsignificant (β = –0.19, p = .260), indicating that participants' VPA frequency at initial status had no impact on the rate of VPA change over time.

Table 16

Parameter Estimates for the Vigorous Physical Activity Model without Covariates

	Estimates (β)	*SE*	*p* –value (2-tailed)
Means			
Intercept	3.32	0.10	.001
Slope	–0.19	0.04	.001
Variances			
Intercept	2.725	0.43	.001
Slope	0.12	0.09	.194
Error1	3.27	0.43	.001
Error2	3.55	0.31	.001
Error3	2.83	0.27	.001
Error4	3.15	0.41	.001
Covariance			
Intercept-Slope	–0.19	0.17	.260

Latent Growth Curve Structure Models. To address specific research questions, selected exogenous variables, residuals, and structural covariances were assigned in each of the respective models and tested separately from one another. This process was consistently followed at each model testing. The goodness of fit of the model was determined before reporting the effects of the exogenous variables on the specific physical activity trajectory. Structural models were tested controlling for gender, family annual income, and parent's marital status.

Research Questions and Hypothesized Relationships

Several hypotheses were raised after a review of the literature (Chapter 2). These were posed a priori in Chapter 3, and the findings were specifically settled after addressing the research questions.

Question 1. *What are the effects of gender, family annual income, and parent's marital status on the physical activity trajectories—moderate and vigorous—of Latino adolescents as they move from grade 9 to grade 12*?

The effects of gender, family annual income, and parent's marital status on the intercept and slope factors for MPA and VPA were estimated independently from one another and the results after a satisfactory model fitting are displayed in Table 17. The fit indicators for the MPA structural model were χ^2 (12, N = 615) = 11.84, p > .459, CFI = 1.0, RMSEA = .000 with a 90% CI [.000, .041], indicating the model was well-fitting. Gender, family annual income, and parent's marital status exerted nonsignificant (p >

.05) influence on MPA frequency when Latino adolescents were in grade 9 and as they moved from grade 9 to grade 12, as shown in Table 17.

Table 17

Parameter Estimates for the Control Variables in the Models

	Intercept		**Slope**	
	Estimates (β)	*p* –value (2–tailed)	Estimates (β)	*p* –value (2–tailed)
Moderate Physical Activity (MPA)				
Gender	0.14	.454	–0.04	.664
Family annual income	0.04	.305	–0.01	.758
Parent's marital status	0.23	.235	–0.16	.085
Vigorous Physical Activity (VPA)				
Gender	0.81	.001	0.08	.391
Family annual income	–0.01	.731	0.01	.739
Parent's marital status	0.23	.268	–0.02	.849

The VPA structural model was also well specified, as determined by the following goodness-of-fit indicators: χ^2 (12, N = 615) = 13.76, p = .317, CFI = .99, RMSEA = .015 with a 90% CI [.000, .045]. Gender effects were statistically significant only at the initial status (β = 0.81, p = .001), as noted in Table 17. Considering the codes were "0" for females and "1" for males, this finding indicated that male participants had higher levels of VPA frequency (0.81) than females when they were in grade 9. However, as youths move to grade 12, gender effects on VPA rate of change were nonsignificant ((β = 0.8, p = .391). Family annual income and parent's marital status exerted nonsignificant (p > .05) effects on VPA at initial status and as participants became older (Table 17).

Hypothesized Relationships Linked to Question 1. *(a) Group means for physical activity decrease throughout middle adolescence for males and females.* This hypothesis was partially supported by the results in only the VPA model; that is, controlling for gender, parent's marital status, and family annual income, mean VPA frequency of the participants significantly declined (β = –0.22, p = .03) as they moved from grade 9 to grade 12. Results of the MPA model testing did not support this hypothesis (β = 0.09, p = .384) when controlling for gender, parent's marital status, and family annual income; that is, male and female participants on average showed nonsignificant changes in MPA frequency as they moved throughout middle adolescence.

(b) *Compared with girls, boys have more physical activity throughout middle adolescence.* This hypothesis was partially supported by results in the VPA model (Table 17). Gender had nonsignificant effects on MPA for the intercept ($\beta = 0.14$, $p = .454$) or for the slope ($\beta = –0.04$, $p = .664$), suggesting that on average for male and female Latino youths MPA frequency was comparable throughout middle adolescence. However, gender did show significant effects on VPA at initial status ($\beta = 0.81$, $p = .001$), suggesting males exhibited higher VPA frequency than females only at initial status. The male advantage in VPA disappeared as adolescents became older ($\beta = 0.08$, $p = .391$).

(c) *Adolescents in higher-income families are more physically active than adolescents in lower-income families.* Results did not support this hypothesis as noted in Table 17. Family annual income exerted no influence on participants' initial MPA status ($\beta = 0.04$, $p = .305$) or the mean rate of MPA change per year ($\beta = –0.01$, $p = .758$).

Neither did it have effects on participants' initial VPA status ($\beta = -0.01$, $p = .731$) or the mean rate of VPA change per year ($\beta = 0.01$, $p = .739$).

(d) *Adolescents living in households with married parents accumulate more vigorous physical activity than adolescents living in single parent households throughout middle adolescence*. Results did not support this hypothesis (Table 17). Parent's marital status exerted no influence on participants' VPA at initial status ($\beta = 0.23$, $p = .268$) or in the rate of change ($\beta = -0.02$, $p = .849$).

Question 2. *What perception covariates explain change in the moderate and vigorous physical activity trajectories between female and male Latino middle adolescents?*

The effects of self-perception covariates (measured at time 1) on the intercept and slope for MPA and VPA as well as change scores effect on the slope for the respective MPA and VPA models were estimated independently from one another. The corresponding results after a satisfactory model fitting are displayed in Table 18. The fit indicators for the MPA model with self-perception covariates measured at time 1 were well-fitting with the data: χ^2 (22, $N = 615$) = 21.99, $p = .461$, CFI = 1.0, RMSEA = .000 with a 90% CI [.000, .034]. Controlling for gender, family annual income, and parent's marital status, none of the self-perception covariates measured at time 1 exerted a significant effect on MPA at the initial status or at the rate of change (Table 18).

The hypothesized MPA model, including change scores in self-perceptions from time 1 to time 4 as covariates of the slope, and controlling for gender, family annual

income, and parent's marital status, was also well-fitting: χ^2 (30, N = 615) = 26.23, p = .663, CFI = 1.0, RMSEA = .000 with a 90% CI [.000, .025]. Considering that all of the change score predictors were set to 0, the estimated mean MPA rate of change remained nonsignificant (β = –0.03, p = .693). Change score in body weight (perceptions) was the only significant predictor of higher MPA levels as adolescent moved to grade 12 (β = 0.13, p = .027), as noted in Table 18. This finding suggests that the higher the change rate in body weight (perceptions) was, the greater the MPA frequency when participants reached grade 12.

In turn, the fit indicators for the VPA model with the self-perception covariates measured at Time 1, and controlling for gender, family annual income, and parent's marital status, were χ^2 (22, N = 615) = 18.97, p > .647, CFI = 1.0, RMSEA = .000 with a 90% CI [.000, .028], suggesting the model was well-fitting. Results noted in Table 18 show that athletic competence was the only significant perception predictor (β = 1.20, p = .001) for higher VPA at initial status. That is, as athletic competence (perceptions) increased by 1 unit, the frequency of VPA increased by 1.20 days. In other words, the more that Latino adolescents believed they did well in sports activities or thought they possessed athletic abilities, the higher their VPA was.

Table 18

Effects of Self-perceptions on Youths' Physical Activity over Time

	Intercept		**Slope**	
	Estimates (β)	*p* –value (2–tailed)	Estimates (β)	*p* –value (2–tailed)
Moderate physical activity (MPA) - Covariates at Time 1				
Physical appearance	–0.02	.910	–0.06	.504
Athletic competence	0.12	.429	0.05	.512
Social acceptance	–0.02	.931	0.17	.104
Global self-worth	0.05	.809	–0.04	.656
Body weight	–0.01	.974	–0.11	.114
Covariates - Change scores (Time 4 minus Time 1)				
Physical appearance change	^	^	0.05	.464
Athletic competence change	^	^	0.06	.326
Social acceptance change	^	^	0.00	.992
Global self-worth change	^	^	–0.01	.867
Body weight change	^	^	0.13	.027
Vigorous physical activity (VPA) – Covariates at Time 1				
Physical appearance	–0.09	.618	–0.07	.410
Athletic competence	1.20	.001	–0.11	.110
Social acceptance	0.32	.130	0.04	.706
Global self-worth	0.32	.114	–0.09	.333
Body weight	0.22	.125	–0.09	.162
Covariates - Change scores (Time 4 minus Time 1)				
Physical appearance change	^	^	–0.01	.838
Athletic competence change	^	^	0.09	.149
Social acceptance change	^	^	0.05	.476
Global self-worth change	^	^	–0.02	.745
Body weight change	^	^	0.10	.097

^Change scores were covariates of only the slope in the hypothesized models

The fit indicators for the VPA model with change scores as covariates were χ^2 (30, N = 615) = 43.87, p = .049, CFI = .97, RMSEA = .027 with a 90% CI [.002, .044], suggesting the model was well-fitting. None of the change scores in self-perceptions was a predictor of greater VPA over time (Table 18). However, accounting for the effect of all of the change scores in self-perception covariates on the slope, the results indicated that

on average males maintained their VPA advantage (β = 0.30, p = .001) over females in the mean rate of VPA change per year.

Hypothesized Relationships Linked to Question 2. *(e) Change scores of high body weight perceptions significantly predict more vigorous physical activity in males and females.* Results of testing the VPA structural model with body weight (perceptions) measured at time 1 and change scores as covariates in the model did not support this hypothesis as shown in Table 18. However, results of testing the structural MPA model unveiled that change scores, time 4 minus time 1, in body weight (perceptions) was a statistically significant predictor of higher MPA (β = 0.13, p = .027) mean rate of change per year for boys and girls. That is, the higher the body weight (perceptions) rate of change was, the higher the rate of MPA was.

(f) *Higher levels of change in physical appearance and athletic competence perceptions predict higher levels of moderate and vigorous physical activity.* The results of testing the MPA structural model with physical appearance and athletic competence as covariates did not support this hypothesis, as shown in Table 18. Physical appearance and athletic competence exerted nonsignificant effects on MPA. However, the results of the VPA model testing partially supported this hypothesis; that is, whereas physical appearance was a nonsignificant predictor of VPA (β = –.09, p = .618) at grade 9 or when adolescents moved from grade 9 to 12 (β = –.07, p = .410), athletic competence predicted significantly higher VPA at initial status (β = 1.20, p = .001) than VPA as adolescents moved towards grade 12 (β = –0.11, p = .110). Change scores in athletic competence,

time 4 minus time 1, did not predict higher VPA rate of change either (β = 0.09, p = .149).

(g) *Higher levels of social acceptance and global self-worth exert a positive effect on moderate physical activity throughout middle adolescence.* The results of the MPA model testing did not support this hypothesis, as shown in Table 18. Social acceptance effects at initial status (β = –0.02, p = .931) and at the slope (β = .17, p = .104) as well as global self-worth at initial status (β = .05, p = .809) and at the slope (β = –0.04, p = .656) exerted nonsignificant effects on MPA. Similarly, the respective change scores (time 4 minus time 1) of social acceptance or global self-worth (Table 18) also did not influence change on MPA.

Question 3. *What effects do ethnic identity, parent-adolescent communication, and social connectedness have on the moderate and vigorous physical activity trajectories in Latino middle adolescents?*

The results of testing each of the models with ethnic identity, social connectedness, and parent-adolescent communication as covariates of the intercept and slope are displayed in Table 19. The MPA model before interpreting the results had the following fit indicators: χ^2 (18, N = 615) = 24.64, p = .135, CFI = .97, RMSEA = .025 with a 90% CI [.000, .046], suggesting the MPA model was well-fitting of the data. Controlling for gender, family annual income, and parent's marital status, the results showed that ethnic identity had nonsignificant effects on MPA at initial status (β = 0.27, p = .139) or at the rate of MPA change (β = 0.02, p = .837).

Social connectedness exerted a negative effect on MPA (β = –0.38, p = .023) at initial status. The negative coefficient indicated that the more Latino youths felt socially connected, the lower their MPA when participants were in grade 9. However, social connectedness effect on MPA were nonsignificant (β = 0.12, p = .166) as adolescents moved to grade 12. Conversely, parent–adolescent communication (frequency) had a significant positive effect (β = 0.50, p = .002) on MPA when participants were in grade 9; that is, as the frequency of parent–adolescent communication increased by 1 unit, youths' MPA increased by a value of 0.50 at their initial status. Nonetheless, as adolescents moved to grade 12, the intercept in the equation for predicting MPA (β = –0.14, p = .085) was found nonsignificant.

The results of the MPA model testing with change scores, time 4 minus time 1, in ethnic identity, social connectedness, and parent–adolescent communication as covariates of the slope factor are noted in Table 19. The model was well-fitting: χ^2 (24, N = 615) = 25.24, p = .393, CFI = .99, RMSEA = .009 with a 90% CI [.000, .034]. Controlling for the effects of gender, family annual income, and parent's marital status, change scores in social connectedness, ethnic identity, and parent–adolescent communication did not exert significant influence on MPA rate of change as noted in Table 19.

Table 19

Effects of Social Variables on Youths' Physical Activity over Time

	Intercept		**Slope**	
	Estimates (β)	*p* –value (2–tailed)	Estimates (β)	*p* –value (2–tailed)
Moderate physical activity (MPA) – Covariates at Time 1				
Ethnic identity	0.27	.129	0.02	.837
Social connectedness	–0.38	.023	0.12	.166
Parent-adolescent communication	0.50	.002	–0.14	.085
Covariates – Change scores (Time 4 minus Time 1)				
Ethnic identity change	^	^	0.02	.803
Social connectedness change	^	^	–0.02	.806
Parent-adolescent communication change	^	^	0.05	.349
Vigorous physical activity (VPA) – Covariates at Time 1				
Ethnic identity	0.17	.374	0.05	.560
Social connectedness	0.04	.825	0.11	.170
Parent-adolescent communication	0.24	.168	–0.01	.926
Covariates – Change scores (Time 4 minus Time 1)				
Ethnic identity change	^	^	0.03	.661
Social connectedness change	^	^	–0.15	.025
Parent-adolescent communication change	^	^	0.01	.917

^Change scores were covariates of only the slope in the hypothesized models

Results for the VPA structural model testing with the effects of ethnic identity, parent–adolescent communication, and social connectedness on the intercept and slope are shown in Table 19. The goodness-of-fit indicators for this model were satisfactory: χ^2 (18, N = 615) = 16.91, p > .529, CFI = 1.0, RMSEA = .000 with a 90% CI [.000, .034]. Controlling for gender, family annual income, and parent's marital status, the individual effects of ethnic identity, parent–adolescent communication, and social connectedness on

youths' VPA were nonsignificant at initial status and through middle adolescence as noted in Table 19.

Last, results for the VPA model testing with change scores, time 4 minus time 1, in ethnic identity, social connectedness, and parent–adolescent communication as covariates of the slope are shown in Table 19. The model was well-fitting: χ^2 (24, N = 615) = 41.10, p = .016, CFI = .95, RMSEA = .034 with a 90% CI [.015, .051]. Change scores in ethnic identity (β = 0.03, p = .661) and parent–adolescent communication (β = 0.01, p = .917) exerted nonsignificant effects on the change rate of VPA. However, change scores in social connectedness predicted a significant (β = –0.15, p = .025) negative effect on VPA rate of change as youths move to grade 12. The negative coefficient indicated that participants with larger gains in social connectedness experienced a lower rate of change in VPA frequency. Accounting for the effect of all change scores in ethnic identity, social connectedness, and parent–adolescent communication as covariates of the slope, the results showed a positive gender effect (β = 0.29, p = .001); that is, males maintained their VPA advantage over females in the mean rate of change per year by a value of 0.29 of a VPA day of 20 minutes.

Hypothesized Relationships Linked to Question 3. *(h) Higher levels of ethnic identity, social connectedness, and parent–adolescent communication predict higher levels of moderate physical activity in Latino male and female middle adolescents.*

This hypothesis was partially supported by the results, as noted in Table 19. Ethnic identity had no effect on either the initial status (β = 0.27, p = .129) or the MPA

change rate (β = 0.02, p = .837). Change scores in ethnic identity had nonsignificant (β = 0.02, p = .803) effect on predicting MPA change, either. Social connectedness had a significant (β = –0.38, p = .023) but negative effect on MPA at initial status. This finding suggested that youths who had higher levels of social connectedness when they were in grade 9 also had lower MPA frequency. Social connectedness was not a predictor of MPA change (β = 0.12, p = .166) and the change scores did not predict (β = –.02, p = .806) MPA change either (Table 19).

Parent–adolescent communication (frequency) was the only variable that had a positive effect on MPA (β = 0.50, p = .002) at initial status while controlling for gender, family annual income, and parent's marital status. As communication between parent and adolescent increases by 1 unit in frequency when youths are at grade 9, MPA also increases by 0.5 in frequency. Parent-adolescent communication have no effect on the rate of MPA change (β = –0.14, p = .085). Similarly, change scores in parent–adolescent communication have no significant effect on MPA change (β = 0.05, p = .349).

Question 4. *Comparing the means, variance, and covariance of moderate and vigorous physical activity trajectories in a developmental model that incorporates them, what are the relationships among these trajectories in Latino middle adolescents? What is the effect of gender in an associative physical activity model in Latino middle adolescents?*

The results of the means, variances, and covariances of an associative model that incorporates MPA and VPA latent growth curves are displayed in Table 20. The

goodness-of-fit statistics for the initial associative LGC model was satisfactory: χ^2 (22, N = 615) = 60.53, p = .000, CFI = .93, RMSEA = .053 with a 90% CI [.038, .070]. The means for MPA (β = 2.10, p = .001) and VPA (β = 3.32, p = .001) at initial status were significantly different from zero and indicated that the mean MPA frequency started at 2.10 days per week and the mean VPA frequency started at 3.32 days per week. The mean values of the slopes refer to the mean rate of change per year. However, in this model, the slope values were preceded by a negative sign that indicated a decline in physical activity; however, only the VPA decline was significant (β = –0.19, p = .001). MPA showed no significant (β = –0.05, p = .234) decline.

Regarding variance, or the distribution of activity frequency in the sample, these were substantially different for each activity trajectory at initial status. The MPA variance at the intercept was small and nonsignificant (β = 0.67, p = .074), suggesting that the MPA frequency was very similar for the sample. Conversely, the VPA variance at the intercept was large and significant (β = 2.82, p = .001), indicating the presence of a high level of variability in youths' VPA at initial status. The slope variances were small and nonsignificant for MPA (β = 0.01, p = .877) and VPA (β = 0.13, p = .131). The small variance in the slopes suggests that the mean rate of change for MPA and VPA among participants was similar.

Table 20

Parameter Estimates for the Associative Model

	Model 1: Measurement			**Model 2: Gender effects**		
	(β)	*SE*	*p* –value (2-tailed)	(β)	*SE*	*p* –value (2-tailed)
Means						
MPA intercept	2.10	0.09	.001	2.05	0.12	.001
MPA slope	–0.05	0.04	.234	–0.05	0.06	.434
VPA intercept	3.32	0.10	.001	2.99	0.13	.001
VPA slope	–0.19	0.05	.001	–0.21	0.06	.001
Variance	Factor Variance			Error Variance		
MPA intercept	0.67	0.37	.074	1.15	0.19	.001
MPA slope	0.01	0.09	.877	0.15	0.05	.003
VPA intercept	2.82	0.43	.001	2.23	0.23	.001
VPA slope	0.13	0.09	.131	0.03	0.05	.470
Covariance						
MPA (I) to (S)	0.24	0.15	.116		^	
VPA (I) to (S)	–0.21	0.17	.194		^	
MPA (I) to VPA (I)	1.30	0.22	.001	1.12	0.17	.001
MPA (S) to VPA (S)	0.21	0.04	.001	0.18	0.03	.001
MPA (I) to VPA (S)	–0.23	0.09	.012	–0.20	0.08	.015
VPA (I) to MPA (S)	–0.11	0.10	.286		^	
Gender Effects	**Intercept**			**Slope**		
MPA	0.13	0.19	.481	–0.02	0.09	.871
VPA	0.79	0.20	.001	0.08	0.09	.368

Note: (I) intercept; (S) slope.
^nonsignificant covariance was removed before model testing.

Three of the six plausible covariances were statistically significant (Table 20). In the associative model, positive covariances suggested that the means of the MPA and VPA intercepts as well as the means of the MPA and VPA slopes change together in the same fashion. The mean frequency for MPA corresponded with the mean frequency for VPA (β = 1.30, p = .001) at initial status, and the mean rate of change at the slopes for MPA and VPA (β = 0.21, p = .001) showed a similar pattern. The negative covariance in

the model suggested that the change was in opposite direction. That is, the higher the mean MPA frequency at initial status was, the lower the VPA change rate was (β = –0.23, p = .012) and vice versa. Simply said, those with a low VPA decrease had higher MPA when they were in grade 9.

Gender as a Time-Invariant Predictor of Change in the Associative Model

Nonsignificant covariances were removed from the initial associative model. The variable gender with four factor loadings (regression paths) linked to the slopes and intercepts were added to the model. In turn, the slopes and the intercepts became endogenous or dependent factors in the model, whereas gender became the exogenous factor in the model. Consequently, each endogenous factor (one intercept and one slope for MPA and one slope and one intercept for VPA) was linked to a latent residual, including a total of four residuals. Covariance was then assigned to the residuals instead of the intercepts and slopes. Only residuals associated with significant (p <.05) covariances at the initial LGC model were covaried in the associative model.

The goodness of fit for this model was χ^2 (29, N = 615) = 71.81, p = .000, CFI = .93, RMSEA = .049 with a 90% CI [.035, .063], suggesting a fair fit. The results of this model, including gender effects, are shown in Table 20. Gender was a significant predictor of youths' VPA (β = 0.79, p = .001) at initial status. However, gender had no effect on youths' MPA at initial status (β = 0.13, p = .481) or on change rate for MPA (β = –0.02, p = .871) or for VPA (β = 0.08, p = .368) as noted in Table 20. For females, mean VPA started at 2.99 days per week. Since males had a VPA advantage of 0.79 at

initial status, their mean VPA started at 3.8 days per week. Youths' mean VPA significantly declined (β = –0.21, p = .001) for boys and girls over time, whereas youths' mean MPA showed nonsignificant changes (β = –0.05, p = .434) over time.

Summary

In this chapter, the findings from the statistical analysis of cohort-sequential longitudinal secondary data were discussed. The purpose was to estimate the influence of selected covariates on the trajectory of moderate and vigorous physical activity in self-reported Latino middle adolescents. The initial sample included 628 participants (57.2% female); however, 13 participants had no data on one or more physical activity measures and could not be included in the present analyses, thus rendering a final sample of 615 adolescents. Participants' mean age was 14.7 (SD = 0.63) at time 1. About 64.5% of the parents reported being married at enrollment, and almost 6 out of 10 parents reported an annual family income of US$40,000 or less.

Data analyses included addressing subsets of incomplete data: some were missing by research design, and others were the product of nonresponse. About 71% of the sample was recruited at time 1. The preanalysis suggested the presence of a pattern of missing random data, which were under 35%. A review of the literature strongly supported the use of full information maximum likelihood to address missing data. Maximum likelihood methodology was available through AMOS, and it was therefore used to decrease bias in the likelihood estimates. Several tests were conducted to test for invariance among the cohorts; thus, concluding data was equivalent across the cohorts.

Structural equation modeling techniques were used to test plausible causal hypotheses and to address research questions posed a priori.

The goodness-of-fit indices were used to evaluate the fit of hypothesized models. CFI (values ≥ 0.95), and RMSEA (values ≤ 0.8) were used in this study as they are the most sensitive indexes to models with misspecified indexes (Hu & Bentler, 1999). Adequate cutoff criteria were set to minimize type I error rate or the probability of rejecting the null hypothesis when it is true and type II error rate or the probability of accepting the null hypothesis when it is false (Hu & Bentler, 1998, 1999). By utilizing developmental latent growth curve models, the initial analyses sought to establish significant differences among Latino adolescents by gender, family income, and parent's marital status in regression parameters, covariance, means, and variances.

Trajectories for Latino youths' MPA and VPA had distinctive characteristics throughout middle adolescence. For the average male and female Latino youth, moderate physical activity was 2 days of 30 minutes per week when youths were in grade 9 and was kept at the same frequency through middle adolescence. However, when it came to VPA, there were differences between girls and boys at initial status. The girls in the group had a VPA frequency of 3 days of 20 minutes per week, whereas the boys were more active, starting closer to 4 days of 20 minutes per week; however, these differences between girls and boys, including the overall VPA for the group, decreased as youths became older. Having a family with higher annual income than others or married parents did not impact physical activity in Latino youths. However, other factors affected MPA and VPA differently; for example, those who showed higher levels of athletic

competence reported more VPA at the start of the study, whereas those who reported higher frequency of parent-adolescent communication or higher changes in body weight (perceptions) reported more frequent moderate physical activity.

Chapter 5: Summary, Discussion, Limitations, Policy Implications, Future Research, and Conclusion

In this chapter, I recap this study from the start before opening a discussion of the findings as they relate to extant physical activity research in adolescents. This chapter also addresses limitations and strengths found throughout the study, implications of the findings for the nursing profession and national policies regarding the promotion of physical activity in adolescents of Latino ethnicity through evidence-based strategies, and suggestions for future research.

Summary of the Study

This study is a secondary analysis of data derived from four annual waves of measurements of four cohorts who together formed an overall sample of 615 Central Texan middle adolescents, aged 14 to 18, all of Latino ethnicity. The purpose of the study was to examine social and developmental influences on physical activity using latent growth curve (LGC) analysis. Based on a priori research, variables were selected as influences to be tested in physical activity models; these included physical appearance, athletic competence, social acceptance, global self-worth, body weight, ethnic identity, social connectedness, and parent-adolescent communication. The study is organized into five chapters.

In the first chapter, the significance of studying physical activity over time in Latino middle adolescents was established, based on important premises: (1) Latinos are disproportionally affected by preventable chronic disease, and closing gaps in physical activity is an important part of achieving Healthy People 2020; (2) physical activity's

benefits of preventing and controlling chronic disease processes such as diabetes are well established; (3) adolescence is an important transitional time in which individuals go through changes in multiple domains (biologically, psychologically, and socially), as well as learn and develop important health habits and self-governing skills; (4) self-perceptions and socioenvironmental contexts exert influence on youths' forming current and future health behaviors; and (5) knowledge about Latino youths' normal development and physical activity is limited; one major reason is low Latino participation in previous studies. The conceptual framework for this study was an adapted Pender's Health Promotion Model.

In the second chapter, an extensive review of the literature on adolescent development and physical activity in youths unveiled important gaps to consider: (1) the body of evidence on problematic behaviors, such as substance abuse and sexual risk, was larger than knowledge about typical adolescent development or healthy adaptations, particularly when investigating health-promoting behaviors in Latino youths; (2) previous knowledge about Latino youths' and parents' behaviors has been inferred from studies mostly focused on atypical development; (3) although literature regarding youths was ample, most of the evidence about physical activity comes from studies on American, European, and Australian participants—few studies included Latino youth participants, and in most of them, Latinos made up less than 20% of samples; (4) the predominant research methods in physical activity are cross-sectional surveys with self-reporting instruments; and (5) psychosocial correlates were among the least-studied covariates. No

studies to date have examined a sample comprising exclusively Latino youths in combination with the set of variables that were addressed in this study.

In the third chapter, the methods used in the analysis of secondary data were explicated. Data came from the study "Developing Health Behaviors in Middle Adolescence" (DHBMA). The statistical procedures for this study comprised cleaning and reorganizing the data set, examining and quantifying missing data, and recoding variables. An analysis of the variables showed normal univariate and multivariate distributions. Scales had reliable Cronbach's alphas. The analyses also included estimating SEM power analyses of hypothesized models for RMSEA and overall model fit, tests of cohort invariance, and models testing. In so doing, the trajectories of youths' moderate and vigorous physical activity were established before separately testing the influence of selected covariates on the trajectories, confirming plausible relationships over time. An associative model that aggregated both trajectories was also explored with confirming results of distinct activity trajectories and what the model analysis had separately unveiled.

In Chapter 4, the preanalysis addressed data missingness under 35% from two sources: cohort design and item nonresponse. Maximum likelihood (ML) was used to address data missing at random; this was available through the AMOS statistical program. The decision to use ML was based on meeting two conditions: a large sample size (> 500 participants) and having a multivariate normal distribution. ML did not impute any missing data; instead, it estimated parameters directly using all the information available in the latent variable models, which was already included in the

incomplete data set (Dong & Peng, 2013). There was ample supporting evidence that ML is a superior method than traditional methods in addressing data missingness while controlling for biased effects on the sample (Collins, Schafer, & Kam, 2001; Dong & Peng, 2013; Enders & Bandalos, 2001).

The original sample included 628 participants; however, data from 13 participants were removed from the final analysis due to lack of physical activity observations at any of the 4 waves of measurements. Therefore, the final nonprobability sample included 615 Latino middle adolescents: 356 female (57.9%) and 259 males. The descriptive characteristics of the sample indicated that at time 1, youths' mean age was 14.7 (*SE* = .63), and at time 4, youths' mean age was 17.15 (*SE* = .56); that almost 7 out of 10 Latino youths lived in households with parents who reported being married; and that most of the youths (56.4%) in this sample lived in low-income households (≤ USD$40,000 USD), with more than one-third of this 56% having an annual income of under USD$20,000. These were not uncommon findings for Latino households in the Southern states (DeLuna Castro, 2011; National Healthy Marriage Resource Center, 2017).

On average, these youths reported adequate to high levels of athletic competence, and their ratings were above the midpoint regarding physical appearance, global self-worth or self-esteem, and social acceptance; however, their perception of body weight was also high. Their most significant decline occurred, from time 1 to time 4, on scores of ethnic identity, and the most significant increase occurred on scores of physical appearance. Although not statistically significant, perceptions of social connectedness and parent-adolescent communication gradually increased in scores through the years,

with a large mean gain on self-worth from time 1 to time 4. In terms of associations at time 1, social connectedness, ethnic identity, and parent-adolescent communication were significantly correlated with one another, suggesting that these adolescents were exposed to positive social contexts.

The estimation of statistical power for the root mean square error of approximation suggested that the sample size was large enough to detect covariate effects on the intercept and slope of the physical activity trajectories. The results of the different models' testing showed well-fitting indicators. Three indicators were consistently reported throughout the study: chi-square with *p*-value, CFI, and RMSEA with 90% confidence interval. The last two indicators have high cutoff values ($\geq .95$ and ≤ 0.8) and were the most sensitive indexes to misspecified models (Hu & Bentler, 1998, 1999). In selecting these two indicators, the objective was to maximize high standards of model evaluation and minimize the probability of type I error and type II error.

The findings of the models' testing were specific to moderate and to vigorous physical activity trajectories, including a different set of patterns and influences for each modality. These are addressed next in the Discussion and Policy Implication sections.

Discussion

This study aimed to provide a greater understanding of physical activity trajectories in Latino youths. The main idea behind this endeavor was that learning about specific patterns, prevalence, and correlates of physical activity when Latinos are young and growing up can generate information that translates into evidence-based intervention

strategies to prevent chronic disease development early in life. Based on a priori research mainly from youths of general populations, covariates of potential influence on physical activity trajectories were selected; these included physical appearance, athletic competence, social acceptance, global self-worth, body weight (perceptions), ethnic identity, social connectedness, and parent-adolescent communication.

This study showed that it was possible to build a complete growth curve with simultaneous information from four cohorts of Latino adolescents, even with large missing data. It also showed that cohorts' data have equivalent factor loadings and covariance structure and that the assumption of linearity in the growth curve was tenable for the models. Specifically, the moderate physical activity trajectory across the middle adolescence years was steady and without significant gender disparities at the initial status of the study and at the rate of MPA change through the years, whereas the vigorous physical activity trajectory was higher when adolescents were younger and progressively declined across time as the adolescents grew older.

In this study, age had a negative effect on VPA across time. Conversely, age had no effect on youths' MPA trajectory. Past reviews were inconclusive about a negative relationship between age and physical activity (Biddle, Whitehead, O'Donovan, & Nevill, 2005; Sallis, Prochaska, & Taylor, 2000; Sterdt, Liersch, & Walter, 2014). In this study, the distinction between the relationships of age and MPA and age and VPA in Latino adolescents was possible due to the independent testing of each model. Thus, these are new findings.

Regarding the association of gender and physical activity, gender exerted an effect only on the VPA trajectory. In line with previous research, this corroborated the findings of reviewers who asserted that males were more physically active than females (Biddle et al., 2005; Sallis et al., 2000; Sterdt et al., 2014); however, these researchers did not specify the intensity of the physical activity. The findings of this study that a gender disparity in physical activity was present only in the VPA trajectory corroborated the findings of Timo, Sami, Anthony, and Jarmo (2016), who also found that gender was statistically significant only for vigorous physical activity in a sample of Finnish adolescents. Timo and colleagues (2016), who used a self-reported short IPAQ version to measure VPA and MPA in Findland, established that male adolescents engaged in more vigorous physical activity than girls in a trajectory that spawned 6 years, from grade 7 to grade 12.

Conversely, I found no significant gender disparities in the MPA trajectory of Latino adolescents as Timo and colleagues (2016) did with Finnish adolescents' MPA. My explanation for the concurrency of the findings hinges on certain facts that are similar for both studies. They, as I did, analyzed MPA and VPA trajectories separately. Central Finland, where the Timo and colleagues' study took place, and Central Texas, where DHBMA was conducted, have sparsely populated areas, and physical activity through physical education (PE) classes was among few possibilities possibilities for adolescents to engage in consistent physical activities when they were growing up.

Family annual income, parent's marital status, and ethnic identity had no significant effects on the VPA or MPA trajectories of Latino adolescents. The finding

that there were no income effects on physical activity trajectories in Latino youths was unexpected when compared with the findings of systematic reviews and meta-analyses (Biddle et al., 2005; Sterdt et al., 2014) in which income had a stable and significant relationship with physical activity of youths of general populations. This finding, however, corroborated the findings of (Sallis et al., 2000), who found that socioeconomic status was unrelated to youths' physical activity in general populations.

Parent's marital status did not have a significant effect on VPA; however, this variable approached significance ($\beta = -.16$, $p = .085$) as adolescents moved from grade 9 to grade 12 in the MPA model. For practical purposes, this finding suggests that adolescents whose parent reported not being married accumulated more MPA; perhaps this association relates to the fact that many Latino youths start working after school when they are young or helping with the care of the household. This variable needs to be investigated further in studies with instruments that properly measure the domain of the MPA, and whether the relationship exists, to corroborate the significance of this finding and uncover the reason for it. There were no other studies to associate the findings on this relationship between the parent's marital status and youths' MPA trajectory.

Ethnic identity had no statistically significant effects on MPA or VPA trajectories. The relationship between ethnic identity and physical activity had received little attention in previous physical activity research that addressed adolescent groups. No other studies with which to compare these findings were available. Compared to non-Latino youths, reviewers and meta-analyzers had found a physical activity advantage in non-Latino Whites over Latino youths (Biddle et al., 2005; Sterdt et al., 2014); however, this was a

general finding that did not precisely indicate whether moderate or vigorous physical activity patterns were being compared. Other reviewers were inconclusive about the relationship between ethnicity and physical activity (Sallis et al., 2000; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007).

Results regarding the effects of the WIAL subscales showed athletic competence as the only variable that exerted a significant influence on VPA when adolescents were in grade 9. However, this effect's statistical significance faded as participants moved toward grade 12. The effect of athletic competence at any time on the MPA trajectory was nonexistent. As the MPA question suggests, moderate activities do not require physical effort in youths; therefore, it makes sense that athletic competence did not influence MPA trajectory. Perceptions of athletic competence may be limited to the athletic domain or the feelings one has about his or her own skills to demonstrate physical prowess. Nonetheless, the association of the WIAL subscales in relation with VPA and MPA requires further research. Perhaps, using different instruments, those that are more discriminating of physical activity, in various domains than a general instrument, may help clarify the effects that physical competence has on activities that require moderate intensity, such as jogging and swimming.

In line with other research, Timo and colleagues (2016) also found a significantly positive effect of perceived self-competence or athletic competence toward VPA and MPA at initial status and 6 years later; however, in their study, the self-competence effect on MPA was weak. Babic and colleagues (2014) conducted a systematic review and meta-analysis of physical activity and physical self-concept in youths of general

populations, selecting 64 worldwide studies that included 17 from the United States, 2 from Spain, and 1 from Mexico. They found that those who reported high levels of physical self-concept or physical competence were more likely to engage in leisurely physical activity than those with weaker beliefs about their physical attributes. The leisure domain of physical activities includes sports, exercise, and recreational activities. Those activities can be either vigorous or moderate, thus making the comparison very difficult because the intensity of the leisurely physical activities was not specified in their analysis.

As in this study and in Timo and colleagues' (2016) study, Babic and colleagues (2014) found that age was a significant moderator of perceived competence ($p < .05$). In this study, the influence of perceived athletic competence on VPA was found when youths were at initial status, or grade 9. The finding regarding a significant positive association between physical self-competence and physical activity in youths was also found in two other systematic reviews (Biddle et al., 2005; Sallis et al., 2000). Although mean VPA for all participants in this study declined across time, when the effects of all the change scores in social acceptance, global self-worth, physical appearance, and athletic competence from time 1 to time 4 were accounted for at the rate of VPA change in frequency, males showed on average 6 more minutes of VPA ($\beta = 0.30$, $p < .001$) than females over time. This finding suggested that, on average, the combination of these change scores through middle adolescence favors Latino male adolescents over females.

Regarding body weight perceptions, participants' mean perceptions, on a range of 1 to 4, about their body weight were high at time 1 (3.30, SE = .73), remained high across

time, and were high at time 4 (3.33, *SE* = .76). Participants' actual weights were not measured in this study; thus, a comparison of actual body weight and body weight perceptions cannot be made to determine how realistic youths' body weight perceptions were. Change scores in body weight perceptions exerted no statistically significant effects on the rate of VPA change. However, over time, change in body weight perceptions exerted significant effects on the MPA trajectory in Latino youths, suggesting that those with larger increase in perceptions of body weight, irrespective of actual weight, experienced a more marked MPA increase as they become older.

Experts have found that perceptions of body weight are linked to intrinsic motivation exerting an influence on physical activity and efforts to control or decrease weight in youths (Allender, Cowburn, & Foster, 2006; Berge et al., 2015; Berge, Wall, Larson, Loth, & Neumark-Sztainer, 2013; Shi, Tubb, Fingers, Chen, & Caffrey, 2013; Wong et al., 2014; Wright, 2011), thus it would make sense that for these youths increasing MPA served this purpose. This was an interesting finding. It was possible that Latino youths in this sample thought of moderate activities, such as walking and bicycling, as ways to increase physical activity that were more accessible and cost-free in their routine than not. It was possible that MPA fitted better in their daily routines than VPA, which would had required time to plan; costs; and availability of neighborhood parks, clubs, or gyms.

Over the years, perceptions of body weight in youths, grade 7 through grade 12, sampled from different US states have been monitored. In 2003, compared to White peers (30.8%) and Black peers (22.3%), the overall prevalence for describing oneself as

overweight among Latino youths was 31.6% (Grunbaum et al., 2004). In 2015, this percentage increased more for Latino youths (36.4%) as compared to Black (27%) and White (30.3%) youths (Kann et al., 2016). Grunbaum and colleagues (2004) also reported a gender disparity on overweight perceptions in which more Latino females (36%) than males (27%) felt overweight. These gender disparities in overweight perceptions have increased through the years, with more Latino females (45.3%) than males (28%) reporting feeling overweight in 2015 (Kann et al., 2016).

Regarding weight lost intentions associated with physical activity over the same time period, 49.4% of Latino youths, compared to 44.8% of their White and 34.7% of their Black peers, were trying to lose weight in 2003, including more Latino female (61.7%) than male (37.4%) youths (Grunbaum et al., 2004). However, in 2015, there were even more Latino high school students (53%) than White (44%) and Black (39%) peers trying to lose weight, including 66.4% of Latino female and 40% of Latino male youths (Kann et al., 2016).

Perceptions of weight preferences are influenced by age, acculturation, and cultural norms (Cachelin, Monreal, & Juarez, 2006; Wong et al., 2014). Studies in children and youths of general populations have shown that younger age is associated with higher ratings of preference for thinner figures, particularly for females, as ideal, attractive, and acceptable (Epperson et al., 2014; Rand & Wright, 2001). It is also possible that access to media channels, school, and community spaces, as sources of Anglo acculturation, exerts influence to generate a greater preference for thinner figures and less tolerance for overweight figures (Cachelin et al., 2006). However, research

examining the relationship between perceptions of body size and dieting for weight loss in 229,614 adolescents from 24 countries, including the United States, Canada, and European countries, revealed that body-size perceptions among adolescents change over time concurrently with shifts in their countries' average weights, suggesting a stronger impact of social comparison on body weight–related perceptions rather than on behavior (Quick et al., 2014).

The evidence on the relationship among body size, body perception, and weight loss in ethnically diverse samples in the United States is scant and unclear (Epperson et al., 2014). It is possible that body weight perceptions become more differentiated with age and self-evaluative judgement linked to how much one likes oneself. Comparative social awareness regarding body size also increases with age. In this study, high levels of body weight perception did not impede a significant increase in physical appearance or affect how much participants liked their physical characteristics. It is possible that living in communities with large Latino population around was protective against developing negative perceptions of body images. This is an area that needs further research.

Regarding social connectedness and parent–adolescent communication measured at time 1, there were no statistically significant effects on Latino youths' VPA frequency at initial status; however, adolescents with larger gains in social connectedness had a lower rate VPA change as adolescents grew older. This finding suggested that it is possible that, as Latino adolescents got older, their perceptions on connectedness with others were more differentiated than when they were younger. It also suggested that, although VPA declined for everyone, the change in VPA frequency was lower in youths

who had larger gains in their perceptions of social connectedness, thus showing the protective effects of social connectedness on adolescent development. Yang and colleagues (2014) found a related benefit in the shape of community connectedness, which increased the odds of physical activity in a large sample of high school multiethnic youths (N = 46,588; 0% Latino youths), whereas Rew and colleagues (2013) found that social connectedness contributed the largest partial correlation with physical activity in 1,081 rural multiethnic youths. The sample of Latino youths in this study are part of the 1, 081 youths of the study conducted by Rew and colleagues in 2013.

Social connectedness, particularly school connectedness, in youths of multiethnic backgrounds, in which Latino participation was under 10%, has been associated with academic motivation and achievement, with protection against involvement in health-risk behaviors, positive mental health and emotional well-being in adolescence (McNeely & Falci, 2004; Monahan, Oesterle, & Hawkins, 2010). These health risks may be more of the psychological or mental health domain than of the physical domain as the VPA rate of change was only slowed down. Youths in the sample had not only high levels of parent–adolescent communication but also positive perceptions of physical appearances, which may help explain the protective joint effect of social connectedness and ethnic identity.

Surprisingly, the influence of social connectedness and parent-adolescent communication measured at time 1 exerted opposite effects at the intercept of MPA trajectory. In this study, when adolescents were in grade 9, those with high levels of social connectedness reported a lower level of MPA than those with lower perception of

social connectedness. Younger adolescents who may have felt closer to their parents, peers and teachers might also have perceived that their physical activities after school were low in frequency, or they may not even have had the cognitive judgement and memory to recognize MPA activities that did not make them breathe hard or sweat. It is also possible that some adolescents who felt more socially connected to others had nonphysical activities that kept them occupied after hours or on weekends, or they spent most of their time in activities unrelated to physical activity. It is also possible that students in lower school grades had less consistent responses to the YRBS questionnaires (Brener et al., 2004) than adolescents in higher grades. The relationship between MPA and social connectedness needs to be further investigated with better measurement instruments and other samples of Latino youths.

The results of a statistically significant positive effect of parent–adolescent communication on the intercept of the MPA trajectory indicated that those Latino youths who had high levels of communication with their parents also had high mean MPA levels when they were in grade 9. This finding supports the findings of Berge et al. (2013), (Berge et al., 2015); Davidson and Cardemil (2009), and Ornelas, Perreira, and Ayala (2007). It is possible that high levels of communication between parent and adolescent in the four domains of job or education plans after high school; personal problems or concerns; teachers or classes in school; and things to enjoy also involve encouragement to participate in concurrent or alternative activities, such as, walking, running, or helping with chores at home.

The association of structured physical activities that do not make one breathe hard but that are, however, linked in one's memories with frequent levels of communication with parents might be easier to remember than activities that are not accompanied with high levels of communication between parent and youth. Social connectedness and parent-adolescent communication measured at time 1, however, have no statistically significant effect on the rate of MPA change, nor was the effect statistically significant when adolescents were older. Change scores from time 1 to time 4 on parent-adolescent communication and social connectedness have no statistically significant effect on the rate of change either.

Evidence strongly supports physical activity participation in adolescence and later in adulthood to get the benefits it grants to individuals' present and future health. Prior to the 2008 Physical Activity Guidelines for Americans (U.S. Department of Health and Human Services, 2008), adolescents were encouraged to accumulate vigorous physical activities for at least 20 minutes at a time 3 times a week and moderate physical activities for at least 30 minutes per day for at least 5 days of the week (S. Li, Treuth, & Wang, 2010, p. 848). The new guidelines recommend that youths should engage in 60 minutes or more of daily physical activity, which should be either moderate or vigorous activities, including vigorous, bone-strengthening, and muscle-strengthening activities on at least 3 days of the week (U.S. Department of Health and Human Services, 2008).

Limitations

This study had several limitations, including subsets of nonresponse values in the data set, use of self-report instruments, and the absence of posttest data for single-item measures to determine test-retest reliability. The use of secondary data also included inherent limitations as new researchers lack control over the original data collection process and how well it was carried out (Smith et al., 2011). Using existing data involved the secondary researcher's flexibility in expectations regarding the findings of specific data information or measurement formats. For instance, had I collected data for this study, I would have selected a physical activity instrument that measures body movements in various domains (i.e., school, home, recreational, occupational) and that allows aggregate and disaggregate data for specific analysis. I would have also selected an instrument that measures parent–adolescent communication, specifically in physical activity.

Data collection may have been constrained by the ability of youths' reading comprehension and concentration abilities, errors in self-reporting, memory issues, and whether they were telling the truth or not (Polit & Beck, 2012). Reliability coefficient for the social acceptance subscale ranging from .54 to .61 over the four time points was another limitation affecting the results. Although the survey questions elucidated discriminatory validity between MPA and VPA, it was hard to disentangle the impact of youths' cognitive development when they were in lower versus higher grades on completing the survey with the highest level of fidelity. Despite low correlations between the YRBS single-item MPA and a parallel valid multi-item physical activity measure, the

MPA patterns of prevalence in this sample (17.5%) were comparable with those obtained in Latinos of a large national representative sample of adolescents (25.3%) whose MPA was also measured by the MPA single item in the YRBS (S. Li et al., 2010).

Another limitation encountered relates to the availability of modification indexes. When data are complete, the AMOS statistical program provides researchers with the option to use modification indexes that can correct model misspecifications in the post-hoc analysis. However, when using maximum likelihood in the models to address missingness, no modification indexes are available. In situations where modification indexes are not offered, it is hard to elucidate whether a significant chi-square is a reflection of model misspecification. A correct specification implies that a population exactly matches the hypothesized model and also that the parameters estimated in a sample reflect this structure (Hu & Bentler, 1998). To minimize this risk, CFI and RMSEA with a 90% confidence interval were used in this study as indicators of goodness of fit to detect misspecifications. Misspecifications were not an issue in this study, and no post-hoc analyses were necessary.

Possible constraints considered in this study were the presence of confounding influences due to the inexactitude in the origin of the exogenous variables or the start of changes in the system; for example, high levels of athletic competence did not start at initial status of the study. However, as explained by Little, Preacher, Selig, and Card (2007), although the true causal factor may have occurred earlier in time, violating this assumption is less problematic when one is focused on proximal causes. Little and colleagues (2007) also suggested as key threats to causal inferences in SEM the omitted

variable in the model or the true variable two constructs covary in the model; and the use of proxy variables instead of the intended construct. No proxy variables were included in this study. Had I had the chance to select other variables, I would have included actual weight as a variable to strengthen my findings regarding body weight perceptions. However, omitted variables were beyond my control.

Study Strengths

This study comprised a salient number of strengths, including longitudinal cohort-sequential data collected previously by a large study on adolescents, which permitted me to build and analyze a developmental growth curve of physical activity in exclusively Latino youths using statistical models. The available breadth of data was highly advantageous for the purpose of conducting this study, in addition to economic advantages derived from saving time, energy, money, and resources not readily abundant.

Not many studies have carefully and comparatively examined cognitive and affective influences on the physical activity trajectories of Latino youths in middle adolescence and elucidated temporal sequence effects while controlling for measurement errors. Unlike other studies, this research examined three social measures that resembled and could characterize cultural features of Latino communities and families: high levels of social connectedness, high levels of parent–adolescent communication, and high levels of ethnic identity in the group.

Implications for Nursing

In this study, I adapted Pender's Health Promotion Model as the theoretical framework, in which variables (age, gender, ethnicity and ethnic identity, family annual income, parent's marital status, perceptions on body weight, physical appearance, athletic competence, social acceptance, and global self-worth) were examined for their effects on moderate and vigorous physical activity trajectories in Latino youths. Models are best regarded as approximations of reality, and this study provided an opportunity to examine specific differences in physical activity (MPA and VPA) trajectories, including different correlates. These findings suggest to nurses interested in research the need for customizing physical activity interventions for Latino adolescents by their age. For example, athletic competence lessens its effect on VPA trajectory, and change scores in body weight perceptions have an effect on MPA as adolescents become older.

School nurses and nurses working in advance practice in community settings with children and adolescents could develop interventions that involve parents and community and school leaders to enhance athletic competence and social acceptance among Latino youths as key strategies to increase their VPA and MPA participation, irrespective of gender. Adolescents spend long hours on school campuses from Monday to Friday. Social acceptance through social participation, role models, and adult support at school has been linked to the probability of accumulating more MPA than they would otherwise (Babey, Wolstein, & Diamant, 2016). Nurses working at schools should advocate for the expansion of physical education to include the 4-year span of high school as it would provide greater opportunities for adolescents to accumulate or maintain VPA as they get

older. Nurses working in high schools can implement through a health education curriculum self-development-based principles that engage skills such as cooperation, effort, and learning outcomes, including being more physically active after school.

Nurse providers can integrate as part of their screening tools in primary care a quick assessment of youths' perceptions of athletic competence, social acceptance, and body weight considering that age moderates the effect of athletic competence on VPA, and social acceptance and high perceptions of body weight increase the chances for accumulating MPA as adolescents get older, as evidenced by the findings of this study. Knowing that parent–adolescent communication has an effect on youths' MPA when they are younger, school nurses and nurses working with younger youths at different settings (i.e., outpatient care, rehabilitation centers, day care facilities, refugee centers, and homeless facilities) should engage parents in encouraging their children to be physically active through strategies such as walking together, cleaning the house together, or gardening together. Findings in this study should translate into strategies to increase MPA in Latino youths and family.

Policy Implications

Evidence from this study needs to be corroborated by other studies; however, the findings point to policy implications for the education and training of health professionals in physical activity, for clinical and research practice, and for state and school district revisions of current policies regarding physical activity implementation in schools. For most health professionals, knowledge about physical activity acquired during their basic

training is limited. Educational programs and curriculum content are policy driven. The syllabus must change to include important concepts—for instance, what physical activity is and what domains are comprised in this concept, how physical activity is built in different socioeconomic groups, the relationship and differences between habitual physical activity and recreational physical activities, the doses of moderate physical activities needed to get various age groups to gradually acclimate to new habits and gradually adhere to being physically active, or how to prevent injuries in sports or physical activity of other domains.

Health care professionals take care of people of diverse demographic groups, and one prescription does not work well for everyone. In their training, health professionals should research and reflect on evidence that children and adolescents are forming important health habits that will affect their future health. They should also reflect on how different ethnic groups socialize their kids to group and individual physical activities. Considering the relevance of parent–adolescent communication in Latino communities, health professionals should also be trained to enroll parents in the quest of promoting activities that get the family and the adolescents moving for pleasure and joy. Their training should also include assessment and monitoring of those physical activity interventions that impact lifestyles.

For clinical practice and research, the findings of this study suggested there were two distinct patterns for physical activity behavior in Latino youths through middle adolescence. On one hand, I found low levels of moderate physical activity for both females and males in the group, which were low in frequency and duration according to

national guidelines and remained low through their middle adolescence. The expectation for youths was to have at least 150 minutes of MPA per week; however, the findings showed that, on average, girls and boys had and maintained 66 minutes of MPA per week On the other hand, the group's duration and frequency of vigorous activities met the physical activity guidelines at initial status in this study, set before 2008 (Brener et al., 2004), but declined as the adolescents got older. In this case, youths on average had 6 extra minutes than the expected 60 minutes of VPA per week. However, there were gender differences: boys started at 76 minutes of VPA per week, whereas girls barely met the expected 60 minutes of VPA per week. This is an important finding that needs to be corroborated by other studies. Nonetheless, the existence of evidence regarding physical activity patterns in Latino youths impacts the planning and implementation and potential success of strategic interventions.

As the influence of independent factors on moderate and vigorous physical activity trajectories were considered, a few themes to reflect on emerged: one relates to the role of schools in youths' physical activity. I will expand further on this theme later. Another theme deals with the relationship among connectedness, parent–adolescent communication, and moderate physical activity in Latino youths. It is not surprising to see these three variables linked when addressing Latinos, as ethnic identity may correspond with the symbolic meaning attached to social connectedness and certain behaviors that would undermine adherence to physical activity. The last theme addresses the connection of physical appearance and body weight perceptions. It might look like a contradiction in the findings that, whereas on average, the group of Latino adolescents

increased their physical appearance perceptions positively over time, they also consistently maintained high perceptions of body weight.

In general, there are strong beliefs in the community, including researchers and policy makers, that physical activity is a method to lose weight (Cawley, Meyerhoefer, & Newhouse, 2007; Hales, Stevens, Murray, Taber, & Roberts, 2013). However, whereas physical activity is highly recommended for those aiming to lose weight, this objective is not one of its direct outcomes. Physical activity benefits are well established (American College of Sports Medicine & American Diabetes Association, 2010; Chodzko-Zajko et al., 2009; Hallal, Victora, Azevedo, & Wells, 2006) and help prevent chronic diseases. Conversely, low physical activity is an independent health risk factor from obesity (T. Y. Li et al., 2006; Telford, 2007). The benefits of physical activity are directly related to cardiovascular health, mental health, and bone density, to give a few examples. Whereas everyone would benefit from being physically active, not all the ethnic groups are at equal risk for developing diabetes early in life. These benefits must be better communicated by health care experts and providers with a consistent use of the terminology and message. This is one of the main reasons, along with high rates of preventable chronic diseases and health disparities, that the training of health care professionals in the curriculum of centers for higher education must incorporate physical activity.

Physical Activity for Pleasure or for Competition: The Role of the Schools

Policy makers and health leaders must understand that schools are missing a big opportunity to teach and promote a lifelong behavior that will improve health in the short and long term. Existing current policies regarding physical activity through PE classes vary by states and school districts (Balaji, Brener, & McManus, 2010; Hales et al., 2013; Lee, Burgeson, Fulton, & Spain, 2007; Zhu, Welk, Meredith, & Boiarskaia, 2010). Some schools may fail to comply with state regulations, some state regulations may allow students to earn PE credit through online classes, or PE may be elective in schools (Balaji et al., 2010; Cawley et al., 2007; Lee et al., 2007). In many instances, PE classes are budget driven, and school finances may affect PE activities; however, in other schools, physical activities may be limited to 2 days a week or fewer in the first two years of high school to allocate more time to academics (Cawley et al., 2007; Lee et al., 2007). Not having a firm PE policy in place that promotes physical activity nationwide undermines youths' present and future health.

However, in other schools, physical activity has been centered on sport competition such as football, soccer, and basketball (Balaji et al., 2010; Lee et al., 2007). These are mostly team activities that are seasonal and by nature exclusive. Youths who are not among the top players selected to represent the school but who may have otherwise participated in these team sports start dropping out of one of the few opportunities they have to be active. Furthermore, sports activities are exclusive, and as youths grow up, they may not feel good about being left behind, thus impacting their self-awareness in a critical time when athletic competence perceptions should be reinforced.

In addition, Latino youths have most likely been socialized with collectivist values in which group harmony is favored over personal ambitions. So being physically active for competitive reasons may not be enough motivation for this group. In these instances, youths who are also becoming more self-aware of their competences get the wrong message from the coaches and mentors. Youths see coaches and school mentors as leaders, and the message they get is that they are not good enough to be on the team. Even worse, this process repeats with every season, and those who are selected learn to be active for the primary purpose of competition.

What national policy makers should consider regarding physical activity in schools is that physical activity can and should be taught for the love of being active for pleasure. Public opinion can be educated to generate financial tax support for the policy implementation. VPA in schools should be expanded to different paths to integrate individual sports—for instance, running, jogging, martial arts, bicycling, gymnastics, and dancing. Options should be inclusive of different skills, physical limitations, and experience levels with the type of activity. For example, some children and youths may be better at swimming than running. Perhaps some youths will persist better with dancing than running. The point is clear: we as a society should see physical body movement as part of life that is enjoyable.

Physical activity for pleasure should be well thought of at the state level and school districts. Authorities should plan accordingly, considering some children come from cultural groups that assign more value to activities that promote harmony in the group than to activities that center on individualistic or competitive purposes. The

limitations continue now, as these did in 2006, because schools have limited opportunities for physical activities in quantity and quality for youths (Balaji et al., 2010; Cawley et al., 2007; Hales et al., 2013; Lee et al., 2007), and schools are the main space where children and youths spend most of their daytime during the week to get engaged in organized physical activities, particularly low-income Latino youths. School years are the best years in which to seed the love for physical activities that give pleasure and joy.

The findings related to the association of social connectedness gains in middle adolescence and physical activity that did not increase or decline at a slower pace than in youths with lower social connectedness may be the result of a coincidence that needs further research. It is possible that as adolescents got older, they also became more aware of their perceptions of belonging and the care offered by parents, close family, peers, and other adults in their communities. However, it is also possible that social connectedness may mitigate other developmental demands related to sociocognitive development and academic performance. This association relationship must be further investigated.

Last, in the study, one of the longitudinal findings relates to the average large gain youths had in physical appearance in spite of a consistent high level of body weight perceptions. On the surface, the findings appear contradictory; however, it is possible that Latino youths think of body weight as a transient rather than a permanent characteristic. It is also intuitive to think that youths with large gains in moderate physical activity were also those who have had consistently perceived they were overweight. Exercising and dieting to lose weight has been a consistent motivation in youths of general populations (Allender et al., 2006; Brener et al., 2002; Grunbaum et al., 2004; Kann et al., 2016). It

may not be a coincidence that youths who have higher frequency of parent–adolescent communication at initial status in the study were also high on MPA frequency. Evidence has shown that Latino parents talk with their children about weight loss and weight control through diet and physical activity (Berge et al., 2015).

Future Research

These research findings should be used with caution and without generalizations. It is possible that Latinos living in more metropolitan areas in the United States have different levels of social connectedness, communication with their children, and even levels of ethnic identity as contexts that exert influence on how adolescents perceive their different self-competences. In addition, the findings of this study need to be corroborated by other studies. The negative effect of connectedness on the slope of VPA and on the intercept of MPA needs to be further investigated. It is possible that connectedness holds a different meaning for younger and older adolescents in the Latino community.

In addition, researchers must consider including more comprehensive instruments than single-item measures to measure MPA and VPA within distinctive domains and that allow for aggregation and disaggregation of data by domain (i.e., occupational domain for adolescents that work), providing more substantive information about physical activity patterns. In future research, accelerometers should be included to validate MPA and VPA self-report measures, as well as a plan to test and retest the stability of physical activity measures within 7 to 10 days from the original survey. Last, the parent-adolescent communication tool needs to be updated to include the frequency of

communication regarding physical activity as well as youths' perceptions regarding parents' messages about being more physically active.

Nursing Theory Development

Physical activity affects health outcomes in the short term and long term (Hallal et al., 2006). This study aimed to get an understanding of factors that over time would influence physical activity patterns among Latino adolescents. For this purpose, I adapted Pender's Health Promotion Model (Pender, 2011) as a conceptual framework to allow me to identify a plausible causal structure of influence on physical activity and to organize the variables I selected a priori after an extensive review of the literature on adolescence, Latino youths, and physical activity.

The conceptual framework supported the analysis of variables in a flexible and organized way, facilitating answers to the research questions I proposed at the start of the study. This conceptual framework is based on constructs from social cognitive theory (Bandura, 2004; Bussey & Bandura, 1999), and the major constructs of Pender's conceptual framework are grouped in three salient domains: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcome. This framework also aided with guiding the research process that included changing relationships of the selected constructs in adolescents over time. This framework has helped with the theoretical integration of variables to avoid an overlap of variables by domains.

Conclusion

Reports describe physical activity in Latino youths as declining with gender disparities as adolescents grow older. The findings of this study unveiled two distinctive physical activity patterns. Latino youths' MPA started low when they were in grade 9, and remained unchanged low and free of gender disparities through middle adolescence. Conversely, VPA at initial status was high enough for boys and girls; both met national VPA recommendations despite of substantial gender differences. However, VPA significantly declined over time and it sustained through time the initial gender disparities; that is, Latino males were more physically active than females in their VPA trajectory. However, these findings must be corroborated with further research in other samples of Latino youths.

Simulation studies have convincingly showed that maximum likelihood is one of the most consistent and efficient of the statistical methods to address large missing data in a data set (Enders & Bandalos, 2001). This method works by estimating a likelihood function for each individual data based on the variables that were present so that all the available data were used. Maximum likelihood has been shown to produce unbiased parameter estimates and standard errors under missing at random and missing completely at random datasets. I implemented maximum likelihood in the data of this study through the AMOS program and tested LCG models successfully.

The structural hypothesized VPA and MPA models, expressed in the goodness of fit, identified which predictor variables taken together manifested about physical activity in Latino youths: the initial prevalence status and the rate of change. Of importance were

the effects derived from the predictor variables to explain what the model meant in this study. Community nurses in leading roles that include settings where children develop can be instrumental in promoting early in life physical activity of any intensity that accommodates youths' skills and preferences given their contextual environment and limitations. Promoting, through evidence-based strategies, physical activity early in the life of individuals, particularly young Latinos, should contribute to decreasing early development of preventable chronic disease. The findings of this study represent a contribution to the physical activity literature regarding Latino youths.

Appendix A: Non-Human Subjects Research Determination Letter

OFFICE OF RESEARCH SUPPORT

THE UNIVERSITY OF TEXAS AT AUSTIN

P.O. Box 7426, Austin, Texas 78713 · Mail Code A3200
(512) 471-8871 · FAX (512) 471-8873

FWA # 00002030

Date: 02/06/17

PI: Marlene Tovar

Dept: Nursing

Title: Influences on Physical Activity in Latino Adolescents over Time.

RE: Non-Human Subjects Research Determination

Dear Marlene Tovar:

The Office of Research Support (ORS) reviewed the above protocol submission request and determined it did not meet the criteria for human subjects research as defined in the Common Rule (45 CFR 46) or FDA Regulations (21 CFR 56). IRB review and oversight is not required because the activities involve:

- ☐ No human interactions
- ☐ Classroom activities used to teach methodology and technique
- ☐ Program evaluation where results are not generalized to other services or programs
- ☒ Secondary use of de-identified data set (no direct or links to identifiers)
- ☐ Obtaining information that is not about living individuals
- ☐ Obtaining information from publicly available sets
- ☐ Biographical research that is not generalizable beyond the individual
- ☐ Archival research using existing literature
- ☐ Other (Explain):

At this time you are free to begin your research as IRB approval is not necessary. You should retain this letter with the respective research documents as evidence that IRB review and oversight is not required.

If you have any questions contact the ORS by phone at (512) 471-8871 or via e-mail at orsc@uts.cc.utexas.edu.

Sincerely,

James P. Wilson

James Wilson, Ph.D.
Institutional Review Board Chair

Appendix B: Measurement Instruments

DEMOGRAPHIC INFORMATION

The following variables were selected from the parent's questionnaire.

What is your marital status? Please circle one.

(1) Married

(2) Separated

(3) Widowed

(4) Divorced

(5) Single

What is your family's total annual income? Please circle one.

(1) less than $20,000

(2) $20,001-30,000

(3) $30,001-40,000

(4) $40,001-50,000

(5) $50,001-60,000

(6) $60,001-70,000

(7) $70,001-80,000

(8) $80,001-90,000

(9) $90,001-100,000

(10) $100,001-120,000

(11) $120,001-150,000

(12) Over $150,000

The following variables were selected from the adolescent's questionnaire.

Student's age as reported each year _____ calculated from student's date of birth.

Sex of the participant: (1) Male _____ (2) Female _____

YOUTH RISK BEHAVIOR SURVEY (YRBS)

The following are single item instruments from the YRBS.

Moderate Physical Activity

On how many of the past 7 days did you participate in physical activity for **at least 30 minutes** that did **not** make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors? Circle one.

0	0 days
1	1 day
2	2 days
3	3 days
4	4 days
5	5 days
6	6 days
7	7 days

Vigorous Physical Activity

On how many of the past 7 days did you exercise or participate in physical activity **for at least 20 minutes that made you sweat and breathe hard,** such as basketball, soccer, running, swimming laps, fast bicycling fast dancing, or similar aerobic activities? Circle one.

0	0 days
1	1 day
2	2 days
3	3 days
4	4 days
5	5 days
6	6 days
7	7 days

Body Weight

How do **you** describe your weight? Circle one.

1	Very underweight
2	Slightly Underweight
3	About the right weight
4	Slightly overweight
5	Very overweight

WHAT I AM LIKE (WIAL) SCALE

Physical Appearance Subscale

Choose the descriptions that best reflect what you are like. Please mark with "X" on the side of the teenager that is most likely you in one of the following options:

Item #	Really True for me 4	Sort of True for me 3		Sort of True for me 2	Really True for me 1
4			Some teenagers are *not* happy with the way they look. **BUT Other** teenagers are happy with the way they look.		
13			Some teenagers wish their body was different **BUT Other** teenagers like their body the way it is.		
22			Some teenagers wish their physical appearance was different **BUT Other** teenagers like their physical appearance the way it is.		
31			Some teenagers think that they are good looking **BUT Other** teenagers think that they are not very good looking.		
40			Some teenagers really like their looks **BUT Other** teenagers wish they looked different.		

Athletic Competence Subscale

Choose the descriptions that best reflect what you are like. Please mark with "X" on the side of the teenager that is most likely you in one of the following options.

Item #	Really True for me 4	Sort of True for me 3		Sort of True for me 2	Really True for me 1
3			Some teenagers do very well at all kinds of sports **BUT Other** teenagers *don't* feel that they are very good when it comes to sports.		
12			Some teenagers think they could do well at just about any new athletic activity **BUT Other** teenagers are afraid they might not do well at a new athletic activity.		
21			Some teenagers feel that they are better than others their age at sports **BUT Other** teenagers don't feel they can play as well.		
30			Some teenagers don't do well at new outdoor games **BUT Other** teenagers are good at new games right away.		
39			Some teenagers do not feel that they are very athletic. **BUT Other** teenagers feel that they are very athletic.		

Social Acceptance Subscale

Choose the descriptions that best reflect what you are like. Please mark with "X" on the side of the teenager that is most likely you in one of the following options.

Item #	Really True for me 4	Sort of True for me 3		Sort of True for me 2	Really True for me 1
2			Some teenagers find it hard to make friends. **BUT For** other teenagers it's pretty easy.		
11			Some teenagers have a lot of friends. **BUT Other** teenagers don't have very many friends.		
20			Some teenagers are very hard to like. **BUT Other** teenagers are really easy to like.		
29			Some teenagers are popular with others their age. **BUT Other** teenagers are not very popular.		
38			Some teenagers feel that they are socially accepted. **BUT** Other teenagers wished that more people their age accepted them.		

Global Self-Worth Subscale

Choose the descriptions that best reflect what you are like. Please mark with "X" on the side and option of the teenager that is most likely you in one of the following options.

Item #	Really True for me 4	Sort of True for me 3		Sort of True for me 2	Really True for me 1
9			Some teenagers are often disappointed with themselves **BUT Other** teenagers are pretty pleased with themselves.		
18			Some teenagers don't like the way they are leading their life **BUT Other** teenagers do like the way they are leading their life.		
27			Some teenagers are happy with themselves most of the time **BUT Other** teenagers are often not happy with themselves.		
36			Some teenagers like the kind of person they are **BUT Other** teenagers often wish they were someone else.		
45			Some teenagers are very happy being the way they are **BUT Other** teenagers often wish they were different.		

MULTIGROUP MEASURE OF ETHNIC IDENTITY SCALE

To answer these questions, please circle one from the following options:

(1) Strongly Disagree

(2) Somewhat Disagree

(3) Somewhat Agree

(4) Strongly Agree

1. I have time I have spent time trying to find out more about my own ethnic group, such as its history, traditions, and customs……1 2 3 4
2. I am active in organizations or social groups that include mostly members of my own ethnic group. ……1 2 3 4
3. I have a clear sense of my ethnic background and what it means for me…….1 2 3 4
4. I think a lot about how my life will be affected by the ethnic group I belong to……...……1 2 3 4
5. I am happy that I am a member of the group I belong to……..

   …….1 2 3 4
6. I am not very clear about the role of my ethnicity in my life ……

   ……..1 2 3 4
7. I really have not spent much time trying to learn more about the culture and history of my ethnic group……..1 2 3 4
8. I have a strong sense of belonging to my own ethnic group…….….

……1 2 3 4

9. I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups….1 2 3 4
10. In order to learn more about my ethnic background, I have often talked to other people about my culture……1 2 3 4
11. I have a lot of pride in my ethnic group and its accomplishments ……. ……..1 2 3 4
12. I participate in cultural practices of my own group, such as special food, music, or customs……1 2 3 4
13. I feel a strong attachment towards my own ethnic group…… ……..1 2 3 4
14. I feel good about my cultural or ethnic background…1 2 3 4

SOCIAL CONNECTEDNESS SCALE

To answer these questions, please circle one from the following options:

1 = None; 2 = A little; 3 = Some; and 4 = Very much

1. How much do you feel that adults care about you? 1 2 3 4
2. How much do you feel that school people care about you?

   1 2 3 4
3. How much do you feel that your parents care about you?

   1 2 3 4
4. How much do you feel that your friends care about you?

   1 2 3 4
5. How much do you feel that church leaders care about you?

   1 2 3 4
6. How much do you feel that your family cares about your feelings?

   1 2 3 4
7. How much do you feel that people in your family understand you?

   1 2 3 4
8. How much do you feel that you and your family have lots of fun together?

   1 2 3 4
9. How much do you feel that you get upset at home? 1 2 3 4
10. How much attention does your family give you? 1 2 3 4

PARENT-ADOLESCENT COMMUNICATION SCALE

To answer the following questions, please circle one from the following options,

(1) Never

(2) Rarely

(3) Often

(4) Very often.

How often do you and your parent(s) talk about?

1. Job or education plans after high school…… 1 2 3 4
2. Personal problems/concerns…….. 1 2 3 4
3. Teachers or classes in school…… 1 2 3 4
4. Things you enjoy…….1 2 3 4

References

Ackard, D. M., Neumark-Sztainer, D., Story, M., & Perry, C. (2006). Parent-child connectedness and behavioral and emotional health among adolescents. *American Journal of Preventive Medicine, 30*(1), 59–66. doi:http://dx.doi.org/10.1016/j.amepre.2005.09.013

Agency for Health Care Research and Quality. (2015). 2014 National Healthcare Quality Report. *AHRQ Pub. No. 15–0007.* Rockville, MD: US Department of Health and Human Services.

Allender, S., Cowburn, G., & Foster, C. (2006). Understanding participation in sport and physical activity among children and adults: A review of qualitative studies. *Health Education Research, 21*(6), 826–835. doi: 10.1093/her/cyl063

Allison, P. D. (1987). Estimation of linear models with incomplete data. *Sociological Methodology, 17*, 71–103.

Altschul, I., Lee, S. J., & Gershoff, E. T. (2016). Hugs, not hits: Warmth and spanking as predictors of child social competence. *Journal of Marriage and Family, 78*(3), 695–714. doi:10.1111/jomf.12306

American Academy of Pediatrics. (2015, November 21). Stages of adolescence. Retrieved July 20, 2016, from https://www.healthychildren.org/English/ages-stages/teen/Pages/Stages-of-Adolescence.aspx

American Academy of Pediatrics: Council on Communications. (2013). Children, adolescents and the media. *Pediatrics, 132*(5), 958–961. doi:10.1542/peds.2013-2656

American College of Sports Medicine & American Diabetes Association. (2010). Exercise and type 2 diabetes: American College of Sports Medicine and the American Diabetes Association: Joint position statement. *Medicine and Science in Sports and Exercise, 42*(12), 2282–2303. doi: 10.1249/MSS.0b013e3181eeb61c

Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced Structural Equation Modeling: Issues and Techniques* (pp. 243–277). Mahwah, NJ: Erlbaum.

Arbuckle, J. L. (2016). IBM SPSS Amos 24 user's guide. Retrieved from http://www.csun.edu/itr/downloads/docs/IBM_SPSS_Amos_User_Guide.pdf

Argyriou, E., Bakoyannis, G., & Tantaros, S. (2016). Parenting styles and trait emotional intelligence in adolescence. *Scandinavian Journal of Psychology, 57*(1), 42–49. doi:10.1111/sjop.12266

Arigo, D., Butryn, M. L., Raggio, G. A., Stice, E., & Lowe, M. R. (2016). Predicting change in physical activity: A longitudinal investigation among weight-concerned college women. *Annals of Behavioral Medicine, 50*(5), 629–641. doi:10.1007/s12160-016-9788-6

Atkin, A. J., van Sluijs, E.M.F., Dollman, J., Taylor, W. C., & Stanley, R. M. (2016). Identifying correlates and determinants of physical activity in youth: How can we advance the field? *Preventive Medicine, 87*, 167–169. doi: http://dx.doi.org/10.1016/j.ypmed.2016.02.040

Babey, S. H., Wolstein, J., & Diamant, A. L. (2016). Adolescent physical activity: Role of school support, role models, and social participation in racial and income disparities. *Environment and Behavior, 48*(1), 172–191.

Babic, M. J., Morgan, P. J., Plotnikoff, R. C., Lonsdale, C., White, R. L., & Lubans, D. R. (2014). Physical activity and physical self-concept in youth: Systematic review and meta-analysis. *Sports Medicine, 44*(11), 1589–1601.

Baer, J., & Schmitz, M. F. (2000). Latent growth curve modeling with a cohort sequential design. *Social Work Research, 24*(4), 243–247.

Balaguer, I. (2012). Self-perceptions, self-worth and sport participation in adolescents. *The Spanish Journal of Psychology, 15*(2), 624–630.

Balaji, A. B., Brener, N. D., & McManus, T. (2010). Variation in school health policies and programs by demographic characteristics of US schools, 2006. *Journal of School Health, 80*(12), 599–613. doi: 10.1111/j.1746-1561.2010.00547.x

Baltes, P. B. (1968). Longitudinal and cross-sectional sequences in the study of age and generation effects. *Human Development, 11*(3), 145–171.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*(9), 1175–1184. doi: 10.1037/0003-066X.44.9.1175

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*(2), 248–287. doi:10.1016/0749-5978(91)90022-L

Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian Journal of Social Psychology, 2*(1), 21–41. doi:10.1111/1467-839X.00024

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior, 31*(2), 143–164. doi: 10.1177/1090198104263660

Basu, K. (1999). Child labor: Cause, consequence, and cure, with remarks on international labor standards. *Journal of Economic Literature, 37*(3), 1083–1119. doi:10.1257/jel.37.3.1083

Baumrind, D. (1978). Parental disciplinary patterns and social competence in children. *Youth and Society, 9*(3), 239–276.

Beal, A. C., Ausiello, J., & Perrin, J. M. (2001). Social influences on health-risk behaviors among minority middle school students. *Journal of Adolescent Health, 28*(6), 474–480. doi: 10.1016/S1054-139X(01)00194-X

Benoit, A., Lacourse, E., & Claes, M. (2013). Pubertal timing and depressive symptoms in late adolescence: The moderating role of individual, peer, and parental factors. *Development and Psychopathology, 25*(2), 455–471. doi:10.1017/S0954579412001174

Berge, J. M., MacLehose, R., Loth, K. A., Eisenberg, M., Bucchianeri, M. M., & Neumark-Sztainer, D. (2013). Parent conversations about healthful eating and weight: Associations with adolescent disordered eating behaviors. *JAMA Pediatrics, 167*(8), 746–753. doi: 10.1001/jamapediatrics.2013.78

Berge, J. M., MacLehose, R. F., Loth, K. A., Eisenberg, M. E., Fulkerson, J. A., & Neumark-Sztainer, D. (2015). Parent-adolescent conversations about eating, physical activity and weight: Prevalence across sociodemographic characteristics

and associations with adolescent weight and weight-related behaviors. *Journal of Behavioral Medicine, 38*(1), 122–135. doi: 10.1007/s10865-014-9584-3

Berge, J. M., Wall, M., Larson, N., Loth, K. A., & Neumark-Sztainer, D. (2013). Family functioning: Associations with weight status, eating behaviors, and physical activity in adolescents. *The Journal of Adolescent Health, 52*(3), 351–357. doi:10.1016/j.jadohealth.2012.07.006

Biddle, S. J., Whitehead, S. H., O'Donovan, T. M., & Nevill, M. E. (2005). Correlates of participation in physical activity for adolescent girls: A systematic review of recent literature. *Journal of Physical Activity & Health, 2*(4), 423–434.

Blozis, S. A., & Villarreal, R. (2014). Analytic approaches to the Multigroup Ethnic Identity Measure (MEIM). *Applied Psychological Measurement, 38*(7), 577–580. doi: 10.1177/0146621614536769

Bobko, P. (2001). *Correlation and regression: Applications for industrial organizational psychology and management* (Vol. 2). Thousand Oaks, CA: Sage.

Boutelle, K., Eisenberg, M. E., Gregory, M. L., & Neumark-Sztainer, D. (2009). The reciprocal relationship between parent–child connectedness and adolescent emotional functioning over 5 years. *Journal of Psychosomatic Research, 66*(4), 309–316. doi:10.1016/j.jpsychores.2008.10.019

Bowers, E. P., Johnson, S. K., Buckingham, M. H., Gasca, S., Warren, D.J.A., Lerner, J. V., & Lerner, R. M. (2014). Important non-parental adults and positive youth development across mid- to late-adolescence: The moderating effect of parenting

profiles. *Journal of Youth and Adolescence, 43*(6), 897–918. doi:10.1007/s10964-014-0095-x

Bracey, J. R., Bámaca, M. Y., & Umaña-Taylor, A. J. (2004). Examining ethnic identity and self-esteem among biracial and monoracial adolescents. *Journal of Youth and Adolescence, 33*(2), 123–132. doi: 10.1023/B:JOYO.0000013424.93635.68

Brener, N. D., Collins, J. L., Kann, L., Warren, C. W., & Williams, B. I. (1995). Reliability of the Youth Risk Behavior Survey Questionnaire. *American Journal of Epidemiology, 141*(6), 575–580. doi: 10.1093/oxfordjournals.aje.a117473

Brener, N. D., Kann, L., Kinchen, S. A., Grunbaum, J. A., Whalen, L., Eaton, D., … Ross, J. G. (2004). Methodology of the Youth Risk Behavior Surveillance System. *Morbidity and Mortality Weekly Report, 53*(RR-12), 1–13.

Brener, N. D., Kann, L., McManus, T., Kinchen, S. A., Sundberg, E. C., & Ross, J. G. (2002). Reliability of the 1999 youth risk behavior survey questionnaire. *The Journal of Adolescent Health, 31*(4), 336–342.

Brown, W. J., Trost, S. G., Bauman, A., Mummery, K., & Owen, N. (2004). Test-retest reliability of four physical activity measures used in population surveys. *Journal of Science and Medicine in Sport, 7*(2), 205–215. doi: 10.1016/S1440-2440(04)80010-0

Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review, 106*(4), 676–713. doi: 10.1037//0033-295X.106.4.676

Byrne, B. M. (2010a). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). New York: Routledge.

Byrne, B. M. (2010b). Testing for change over time: The latent growth curve model. In Taylor & Francis Group (Ed.), *Structural equational modeling with AMOS: Basic concepts, applications and programming* (2nd ed., pp. 303–325). New York: Routledge.

Byrne, B. M. (2013a). Structural equation modeling with AMOS : Basic concepts, applications, and programming (2nd ed.). New York: Routledge.

Byrne, B. M. (2013b). *Structural equation modeling with Mplus: Basic concepts, applications, and programming*. New York: Routledge.

Cachelin, F. M., Monreal, T. K., & Juarez, L. C. (2006). Body image and size perceptions of Mexican American women. *Body Image, 3*(1), 67–75. doi:10.1016/j.bodyim.2005.10.006

Cağlar, E. (2009). Similarities and differences in physical self-concept of males and females during late adolescence and early adulthood. *Adolescence, 44*(174), 407–419.

Campbell, K., Garcia, D. M., Granillo, C. V., & Chavez, D. V. (2012). Exploring the Latino paradox: How economic and citizenship status impact health. *Hispanic Journal of Behavioral Sciences, 34*(2), 187–207. doi: 10.1177/0739986312437552

Canadian Paediatric Society. (2003). Age limits and adolescents. *Paediatrics & Child Health, 8*(9), 577–577.

Carranza, F. D., You, S., Chhuon, V., & Hudley, C. (2009). Mexican American adolescents' academic achievement and aspirations: The role of perceived parental educational involvement, acculturation, and self-esteem. *Adolescence, 44*, 313–333.

Carter, J. S., Smith, S., Bostick, S., & Grant, K. E. (2014). Mediating effects of parent–child relationships and body image in the prediction of internalizing symptoms in urban youth. *Journal of Youth and Adolescence, 43*(4), 554–567. doi:10.1007/s10964-013-9985-6

Cartland, J., & Ruch-Ross, H. S. (2006). Health behaviors of school-age children: Evidence from one large city. *Journal of School Health, 76*(5), 175–180. doi: 10.1111/j.1746-1561.2006.00091.x

Cawley, J., Meyerhoefer, C., & Newhouse, D. (2007). The impact of state physical education requirements on youth physical activity and overweight. *Health Economics, 16*(12), 1287–1301. doi: 10.1002/hec.1218

Centers for Disease Control and Prevention. (2012). National diabetes fact sheet: National estimates and general information on diabetes and prediabetes in the United States. Atlanta, GA: U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention. (2014, May 23). Facts about physical activity. Retrieved from http://www.cdc.gov/physicalactivity/data/facts.htm

Centers for Disease Control and Prevention. (2015, May 5). Hispanics' health in the United States. Retrieved from http://www.cdc.gov/media/releases/2015/p0505-hispanic-health.html

Centers for Disease Control and Prevention. (2016, August 11). Youth Risk Behavior Surveillance System (YRBSS). Retrieved October 5, 2016, from http://www.cdc.gov/healthyyouth/data/yrbs/index.htm

Child Trends Hispanic Institute. (2014). America's Hispanic children: Gaining ground, looking forward. Retrieved from http://www.childtrends.org/hispanic-institute/

Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., Salem, G. J., & Skinner, J. S. (2009). Exercise and physical activity for older adults. *Medicine and Science in Sports & Exercise, 41*(7), 1510–1530. 1510.1249/MSS.1510b1013e3181a1510c1595c.

Christie, D., & Viner, R. (2005). Adolescent development. *British Medical Journal 330*(7486), 301–304.

Chun, H., & Mobley, M. (2014). The "Immigrant Paradox" phenomenon: Assessing problem behaviors and risk factors among immigrant and native adolescents. *The Journal of Primary Prevention, 35*(5), 339–356. doi:10.1007/s10935-014-0359-y

Cole, D. A., Maxwell, S. E., Martin, J. M., Peeke, L. G., Seroczynski, A. D., Tram, J. M., … Maschman, T. (2001). The development of multiple domains of child and adolescent self-concept: A cohort sequential longitudinal design. *Child Development, 72*(6), 1723–1746.

Collins, L. M., Schafer, J. L., & Kam, C. M. (2001). A comparison of inclusive and restrictive strategies in modern missing data procedures. *Psychological Methods, 6*(4), 330–351. doi: 10.1037//1082-989X.6.4.330

Conger, R. D., Wallace, L. E., Sun, Y., Simons, R. L., McLoyd, V. C., & Brody, G. H. (2002). Economic pressure in African American families: A replication and extension of the family stress model. *Developmental Psychology, 38*(2), 179–193. doi:10.1037//0012-1649.38.2.179

Cooley, C. H. (1922). *Human nature and the social order*. New York: Charles Scribner's Sons.

Corbin, C. B., Pangrazi, R. P., & Welk, G. J. (1994). *Toward an understanding of appropriate physical activity levels for youth.* President's Council on Physical Fitness and Sports.

Corder, K., Ekelund, U., Steele, R. M., Wareham, N. J., & Brage, S. (2008). Assessment of physical activity in youth. *Journal of Applied Physiology, 105*(3), 977–987. doi:10.1152/japplphysiol.00094.2008

Cox, A. E., Cole, A. N., & Laurson, K. (2016). The moderating role of physical self-perceptions in the relationship between maturity status and physical self-worth. *Research Quarterly for Exercise and Sport, 87*(2), 200. doi:10.1080/02701367.2016.1143910

Craig, C. L., Sallis, J. F., Oja, P., Marshall, A. L., Sjöström, M., Bauman, A. E., … Yngve, A. (2003). International Physical Activity Questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise, 35*(8), 1381–1395. doi: 10.1249/01.MSS.0000078924.61453.FB

Crespo, C. J., Smit, E., Andersen, R. E., Carter-Pokras, O., & Ainsworth, B. E. (2000). Race/ethnicity, social class and their relation to physical inactivity during leisure

time: Results from the Third National Health and Nutrition Examination Survey, 1988–1994. *American Journal of Preventive Medicine, 18*(1), 46–53. doi: 10.1016/S0749-3797(99)00105-1

Crisci, A. (2012). Estimation methods for the structural equation models: Maximum likelihood, partial least squares, and generalized maximum entropy. *Journal of Applied Quantitative Methods, 7*(2), 3.

Crocker, P., McDonough, M., Kowalski, K., Kowalski, N., & Sabiston, C. (2006). Longitudinal assessment of the relationship between physical self-concept and health-related behavior and emotion in adolescent girls. *Journal of Applied Sport Psychology, 18*(3), 185–200. doi:10.1080/10413200600830257

Crocker, P., Sabiston, C., Forrestor, S., Kowalski, N., Kowalski, K., & McDonough, M. (2003). Predicting change in physical activity, dietary restraint, and physique anxiety in adolescent girls: Examining covariance in physical self-perceptions. *Canadian Journal of Public Health, 94*(5), 332–337.

Crosnoe, R., & Elder, G. H. (2004). Family dynamics, supportive relationships, and educational resilience during adolescence. *Journal of Family Issues, 25*(5), 571–602. doi:10.1177/0192513x03258307

Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development, 11*(2), 121–136. doi: 10.1080/15248371003699969

Darghouth, S., Brody, L., & Alegria, M. (2015). Does marriage matter? Marital status, family processes, and psychological distress among Latino men and women. *Hispanic Journal of Behavioral Sciences, 37*(4), 482.

Dasen, P. R. (2000). Rapid social change and the turmoil of adolescence: A cross-cultural perspective. *International Journal of Group Tensions, 29*(1–2), 17–49.

Davey, A., & Savla, J. (2010). *Statistical power analysis with missing data: A structural equation modeling approach*. New York: Routledge.

Davidson, A. J., Updegraff, K. A., & McHale, S. M. (2011). Parent/peer relationship patterns among Mexican-origin adolescents. *International Journal of Behavioral Development, 35*(3), 260–270. doi:10.1177/0165025410384926

Davidson, T. M., & Cardemil, E. V. (2009). Parent-child communication and parental involvement in Latino adolescents. *The Journal of Early Adolescence, 29*(1), 99–121. doi:10.1177/0272431608324480

De Feo, P., Di Loreto, C., Ranchelli, A., Fatone, C., Lucidi, P., & Santeusanio, F. (2007). Physical inactivity is the main cause of the metabolic syndrome. In V. Stochi, P. De Feo & D. A. Hood (Eds.), *Role of physical exercise in preventing disease and improving the quality of life* (pp. 23–31). Italy: Springer.

DeLuna Castro, E. (2015). Poverty 101 (pp. 1–5). Texas: The Center for Public Policy Priorities.

Dentro, K. N., Sothern, M. S., Katzmarzyk, P. T., Beals, K., Crouter, S. E., Eisenmann, J. C., … Pennington Biomedical Research Center, B.R.L.A. (2014). Results from the United States' 2014 report card on physical activity for children and youth.

Journal of Physical Activity and Health 11(4 Suppl 1), S105–S112. doi: 10.1123/jpah.2014-0184

Dewar, D. L., Plotnikoff, R. C., Morgan, P. J., Okely, A. D., Costigan, S. A., & Lubans, D. R. (2013). Testing social-cognitive theory to explain physical activity change in adolescent girls from low-income communities. *Research Quarterly for Exercise and Sport, 84*(4), 483. doi: 10.1080/02701367.2013.842454

Diggle, P. (2002). *Analysis of longitudinal data* (2nd ed. Vol. 25). Oxford; New York: Oxford University Press.

Ding, D., & Gebel, K. (2012). Built environment, physical activity, and obesity: What have we learned from reviewing the literature? *Health & Place, 18*(1), 100–105. doi: http://dx.doi.org/10.1016/j.healthplace.2011.08.021

Ding, D., Sallis, J. F., Kerr, J., Lee, S., & Rosenberg, D. E. (2011). Neighborhood environment and physical activity among youth: A review. *American Journal of Preventive Medicine 41*(4), 442.

Dolbier, C. L., Webster, J. A., McCalister, K. T., Mallon, M. W., & Steinhardt, M. A. (2005). Reliability and validity of a single-item measure of job satisfaction. *American Journal of Health Promotion, 19*(3), 194–198. doi: 10.4278/0890-1171-19.3.194

Dong, Y., & Peng, C.-Y. J. (2013). Principled missing data methods for researchers. *SpringerPlus, 2*(1), 10–17. doi: 10.1186/2193-1801-2-222

Dressler, W. W., Oths, K. S., & Gravlee, C. C. (2005). Race and ethnicity in public health research: Models to explain health disparities. *Annual Review of Anthropology, 34*, 231–252. doi:10.2307/25064884

Duncan, S. C., & Duncan, T. E. (1994). Modeling incomplete longitudinal substance use data using latent variable growth curve methodology. *Multivariate Behavioral Research, 29*(4), 313–338.

Duncan, S. C., Duncan, T. E., & Hops, H. (1996). Analysis of longitudinal data within accelerated longitudinal designs. *Psychological Methods, 1*(3), 236–248. doi: 10.1037/1082-989X.1.3.236

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2001). Qualitative and quantitative shifts in adolescent problem behavior development: A cohort-sequential multivariate latent growth modeling approach. *Journal of Psychopathology and Behavioral Assessment, 23*(1), 43–50. doi: 10.1023/A:1011091523808

Duncan, S. C., Duncan, T. E., Strycker, L. A., & Chaumeton, N. R. (2007). A cohort-sequential latent growth model of physical activity from ages 12 to 17 years. *Annals of Behavioral Medicine, 33*(1), 80–89. doi: 10.1207/s15324796abm3301_9

Dwyer-Lindgren, L., Freedman, G., Engell, R. E., Fleming, T. D., Lim, S. S., Murray, C.J.L., & Mokdad, A. H. (2013). Prevalence of physical activity and obesity in US counties, 2001–2011: A road map for action. *Population Health Metrics, 11*, 7.

Eakin, B. L., Villarruel, A. M., John, B. J., III, & Jemmott, L. S. (2005). Physical activity in Latino adolescents: Understanding influences on activity intentions. *Hispanic Health Care International, 3*(3), 125–131.

Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S., Flint, K. H., Hawkins, J., … Prevention. (2012). Youth risk behavior surveillance—United States, 2011. *Morbidity and Mortality Weekly Report. , 61*(4), 1–162.

Edwardson, C. L., & Gorely, T. (2010). Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychology of Sport and Exercise, 11*(6), 522–535. doi: http://dx.doi.org/10.1016/j.psychsport.2010.05.001

Elgar, F. J., Pförtner, T.-K., Moor, I., De Clercq, B., Stevens, G. W., & Currie, C. (2015). Socioeconomic inequalities in adolescent health 2002–2010: A time-series analysis of 34 countries participating in the health behaviour in school-aged children study. *The Lancet, 385*(9982), 2088–2095. doi: 10.1016/S0140-6736(14)61460-4

Elliott, S., & Aseltine, E. (2013). Raising teenagers in hostile environments: How race, class, and gender matter for mothers' protective carework. *Journal of Family Issues, 34*(6), 719–744. doi:10.1177/0192513X12452253

Emerson, P. M., Ponczek, V., & Souza, A. P. (2016). Child labor and learning. *Economic Development and Cultural Change*. doi:10.1086/688895

Emken, B. A., Li, M., Thatte, G., Lee, S., Annavaram, M., Mitra, U., … Spruijt-Metz, D. (2012). Recognition of physical activities in overweight Hispanic youth using KNOWME Networks. *Journal of Physical Activity & Health, 9*(3), 432–441.

Enders, C. K. (2001). The performance of the full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement, 61*(5), 713–740. doi: 10.1177/00131640121971482

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal, 8*(3), 430–457. doi: 10.1207/S15328007SEM0803_5

Ennis, S. R., Rios-Vargas, M., & Albert, N. G. (2011). The Hispanic population: 2010 *Census Briefs C2010BR-04, U.S. Census Bureau, Washington DC.*

Epperson, A. E., Song, A. V., Wallander, J. L., Markham, C., Cuccaro, P., Elliott, M. N., & Schuster, M. A. (2014). Associations among body size, body image perceptions, and weight loss attempts among African American, Latino, and White youth: A test of a mediational model. *Journal of Pediatric Psychology, 39*(4), 394–404. doi: 10.1093/jpepsy/jst096

Esnaola Etxaniz, I. (2008). *El autoconcepto físico durante el ciclo vital* [The physical self-concept during the life span]. *Anales de Psicología, 24*(1), 1–8.

Factor, R., Kawachi, I., & Williams, D. R. (2011). Understanding high-risk behavior among non-dominant minorities: A social resistance framework. *Social Science and Medicine, 73*(9), 1292–1301. doi: 10.1016/j.socscimed.2011.07.027

Federal Interagency Forum on Child and Family Statistics. (2014). America's children: Key national indicators of well-being, 2014, Table POP3. Retrieved from http://www.childstats.gov/americaschildren/tables.asp

Feldman, S. S., & Elliott, G. R. (1990). *At the threshold: The developing adolescent.* Cambrige, MA: Harvard University Press.

Fox, K. R., & Corbin, C. B. (1989). The Physical Self-Perception Profile: Development and preliminary validation. *Journal of Sport and Exercise Psychology, 11*(4), 408–430. doi:doi:10.1123/jsep.11.4.408

Franko, D. L., & Striegel-Moore, R. H. (2002). The role of body dissatisfaction as a risk factor for depression in adolescent girls: Are the differences Black and White? *Journal of psychosomatic research, 53*(5), 975–983.

Fredricks, J. A., & Simpkins, S. D. (2012). Promoting positive youth development through organized after-school activities: Taking a closer look at participation of ethnic minority youth. *Child Development Perspectives, 6*(3), 280–287. doi: 10.1111/j.1750-8606.2011.00206.x

Garcia, A. W., Broda, M. A., Frenn, M., Coviak, C., Pender, N. J., & Ronis, D. L. (1995). Gender and developmental differences in exercise beliefs among youth and prediction of their exercise behavior. *The Journal of School Health, 65*(6), 213.

Gardner, D. G., Cummings, L. L., Dunham, R. B., & Pierce, J. L. (1998). Single-item versus multiple-item measurement scales: An empirical comparison. *Educational and Psychological Measurement, 58*(6), 898–915. doi:10.1177/0013164498058006003

Germán, M., Gonzales, N. A., & Dumka, L. (2009). Familism values as a protective factor for Mexican-origin adolescents exposed to deviant peers. *The Journal of Early Adolescence, 29*(1), 16–42. doi: 10.1177/0272431608324475

Gill, D. P., Jones, G. R., Zou, G., & Speechley, M. (2012). Using a single question to assess physical activity in older adults: A reliability and validity study. *BMC Medical Research Methodology, 12*(1), 1–10. doi: 10.1186/1471-2288-12-20

Gillis, A. J. (1994). Determinants of health-promoting lifestyles in adolescent females. *Canadian Journal of Nursing Research, 26*(2), 13–28.

Gillis, A. J. (1997). The Adolescent Lifestyle Questionnaire: Development and psychometric testing. *The Canadian Journal of Nursing Research, 29*(1), 29.

Graham, J. W. (2003). Adding missing-data-relevant variables to FIML-based structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal, 10*(1), 80–100. doi: 10.1207/S15328007SEM1001_4

Greif, A. (1994). Cultural beliefs and the organization of society: A historical and theoretical reflection on collectivist and individualist societies. *Journal of Political Economy*, 912–950.

Grunbaum, J. A., Kann, L., Kinchen, S., Ross, J., Hawkins, J., Lowry, R., … Collins, J. (2004). Youth risk behavior surveillance—United States, 2003. *Morbidity and Mortality Weekly Report, 53*(2), 1–96.

Guedes, N. G., Moreira, R. P., Cavalcante, T. F., de Araujo, T. L., & Ximenes, L. B. (2009). Students' physical activity: An analysis according to Pender's Health Promotion Model. *Revista da Escola de Enfermagem da U S P, 43*(4), 774.

Hagger, M. S., Biddle, S.J.H., & John Wang, C. K. (2005). Physical self-concept in adolescence: Generalizability of a multidimensional, hierarchical model across gender and grade. *Educational and Psychological Measurement, 65*(2), 297–322. doi: 10.1177/0013164404272484

Hales, D., Stevens, J., Murray, D. M., Taber, D. R., & Roberts, A. (2013). Identifying state-level policy and provision domains for physical education and physical activity in high school. *The International Journal of Behavioral Nutrition and Physical Activity, 10*(1), 86. doi: 10.1186/1479-5868-10-86

Hallal, P. C., Victora, C. G., Azevedo, M. R., & Wells, J.C.K. (2006). Adolescent physical activity and health: A systematic review (Vol. 36, pp. 1019–1030). Cham: Adis International.

Hanson, M. D., & Chen, E. (2007). Socioeconomic status and health behaviors in adolescence: A review of the literature. *Journal of Behavioral Medicine, 30*(3), 263–285. doi: 10.1007/s10865-007-9098-3

Harris, L. J., Resnick, M. D., Rosenwinkel, K., & Blum, R. W. (1990). Technical report on the adolescent health survey: Psychometric properties of scales and indices. Minneapolis: University of Minnesota Adolescent Health Training Program.

Harter, S. (2012). Self-perception profile for adolescents: Manual and questionnaires. Denver, CO: University of Denver, Department of Psychology.

Harter, S., & Bukowski, W. M. (2012). *The construction of the self: Developmental and sociocultural foundations* (Vol. 2). New York: Guilford Press.

Herman, W. H. (2013). The economic costs of diabetes: Is it time for a new treatment paradigm? *Diabetes Care, 36*(4), 775–776.

Heydari, A., & Khorashadizadeh, F. (2014). Pender's health promotion model in medical research. *Journal of the Pakistan Medical Association, 64*(9), 1067–1074.

Hu, L.-t. (1997). George A. Marcoulides and Randall E. Schumacker (Eds.), "Advanced Structural Equation Modeling: Issues and Techniques" (Book Review) (Vol. 110, p. 474). Urbana, etc: University of Illinois Press.

Hu, L.-t., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*(4), 424–453. doi: 10.1037/1082-989X.3.4.424

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. doi: 10.1080/10705519909540118

Huang, C. (2011). Self-concept and academic achievement: A meta-analysis of longitudinal relations. *Journal of School Psychology, 49*(5), 505–528. doi:10.1016/j.jsp.2011.07.001

Huang, J. S., Norman, G. J., Zabinski, M. F., Calfas, K., & Patrick, K. (2007). Body image and self-esteem among adolescents undergoing an intervention targeting dietary and physical activity behaviors. *Journal of Adolescent Health, 40*(3), 245–251. doi:10.1016/j.jadohealth.2006.09.026

Huebner, A. J., & Howell, L. W. (2003). Examining the relationship between adolescent sexual risk-taking and perceptions of monitoring, communication, and parenting

styles. *Journal of Adolescent Health, 33*(2), 71–78. doi:10.1016/S1054-139X(03)00141-1

Humbert, M. L., Chad, K. E., Bruner, M. W., Spink, K. S., Muhajarine, N., Anderson, K. D., … Gryba, C. R. (2008). Using a naturalistic ecological approach to examine the factors influencing youth physical activity across grades 7 to 12. *Health Education & Behavior, 35*(2), 158–173. doi:10.1177/1090198106287451

Humbert, M. L., Chad, K. E., Spink, K. S., Muhajarine, N., Anderson, K. D., Bruner, M. W., . . . Gryba, C. R. (2006). Factors that influence physical activity participation among high- and low-SES youth. *Qualitative Health Research, 16*(4), 467-483. doi: 10.1177/1049732305286051Jaworska, N., & MacQueen, G. (2015). Adolescence as a unique developmental period. *Journal of Psychiatry and Neuroscience, 40*(5), 291–293. doi: 10.1503/jpn.150268

IBM. (2013). Statistical Package for the Social Sciences (Version 22.0).

IBM. (2015). Analysis of Moment Structures (Version 23.0).

James, W. (1892). *Psychology: The briefer course*. New York: Macmillan and Co.

Jamieson, K. M., Araki, K., Chung, Y. C., & Kwon, S. Y. (2005). Mujeres (in)activas: An exploratory study of physical activity among adolescent latinas: 1. *Women in Sport & Physical Activity Journal, 14*(1), 95.

Kagitcibasi, C. (2005). Autonomy and relatedness in cultural context: Implications for self and family. *Journal of Cross-Cultural Psychology, 36*(4), 403–422. doi:10.1177/0022022105275959

Kagitcibasi, C. (2013). Adolescent autonomy-relatedness and the family in cultural context: What is optimal? *Journal of Research on Adolescence, 23*(2), 223–235. doi:10.1111/jora.12041

Kahn, J. A., Huang, B., Gillman, M. W., Field, A. E., Austin, S. B., Colditz, G. A., & Frazier, A. L. (2008). Patterns and determinants of physical activity in U.S. adolescents. *Journal of Adolescent Health, 42*(4), 369–377. doi: 10.1016/j.jadohealth.2007.11.143

Kann, L., McManus, T., Harris, W. A., Shanklin, S. L., Flint, K. H., Hawkins, J., … Zaza, S. (2016). Youth Risk Behavior Surveillance—United States, 2015. *Morbidity and Mortality Weekly Report, 65*(6), 1–174. doi: 10.15585/mmwr.ss6506a1

Kantor, R. M., Grimes, G. R., & Limbers, C. A. (2015). Physical activity, sedentary behaviors, and health-related quality of life in rural Hispanic youth. *Translational Issues in Psychological Science, 1*(3), 239–249. doi:10.1037/tps0000030

Kavanaugh, K., Moore, J. B., Hibbett, L. J., & Kaczynski, A. T. (2015). Correlates of subjectively and objectively measured physical activity in young adolescents. *Journal of Sport and Health Science, 4*(3), 222–227. doi: http://dx.doi.org/10.1016/j.jshs.2014.03.015

Kennett, D. J., & Nisbet, C. (1998). The influence of body mass index and learned resourcefulness skills on body image and lifestyle practises. *Patient Education and Counseling, 33*(1), 1–12. doi:http://dx.doi.org/10.1016/S0738-3991(97)00049-9

Kenny, M. C., & McEachern, A. (2009). Children's self-concept: A multicultural comparison. *Professional School Counseling, 12*(3), 207.

Killoren, S. E., Updegraff, K. A., & Christopher, F. S. (2011). Family and cultural correlates of Mexican-origin youths' sexual intentions. *Journal of Youth and Adolescence, 40*(6), 707–718. doi:10.1007/s10964-010-9587-5

Killoren, S. E., Wheeler, L. A., Updegraff, K. A., Rodriguez de Jesus, S. A., & McHale, S. M. (2015). Longitudinal associations among parental acceptance, familism values, and sibling intimacy in Mexican-origin families. *Family Process, 54*(2), 217–231. doi: 10.1111/famp.12126

Kim, K. H. (2005). The relation among fit indexes, power, and sample size in structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal, 12*(3), 368–390. doi: 10.1207/s15328007sem1203_2

Kim, Y., Barreira, T. V., & Kang, M. (2016). Concurrent associations of physical activity and screen-based sedentary behavior on obesity among US adolescents: A latent class analysis. *Journal of Epidemiology, 26*(3), 137–144. doi: 10.2188/jea.JE20150068

Kirkcaldy, B. D., Shephard, R. J., & Siefen, R. G. (2002). The relationship between physical activity and self-image and problem behaviour among adolescents. *Social Psychiatry and Psychiatric Epidemiology, 37*(11), 544–550. doi:10.1007/s00127-002-0554-7

Kiviruusu, O., Konttinen, H., Huurre, T., Aro, H., Marttunen, M., & Haukkala, A. (2016). Self-esteem and body mass index from adolescence to mid-adulthood. A 26-year

follow-up. *International Journal of Behavioral Medicine, 23*(3), 355–363. doi:10.1007/s12529-015-9529-4

Koepke, S., & Denissen, J. J. A. (2012). Dynamics of identity development and separation–individuation in parent–child relationships during adolescence and emerging adulthood—A conceptual integration. *Developmental Review, 32*(1), 67–88. doi:10.1016/j.dr.2012.01.001

Kumar, B., Robinson, R., & Till, S. (2015). Physical activity and health in adolescence. *Clinical Medicine 15*(3), 267–272. doi: 10.7861/clinmedicine.15-3-267

Laguna, M., Ruiz, J. R., Gallardo, C., García-Pastor, T., Lara, M. T., & Aznar, S. (2013). Obesity and physical activity patterns in children and adolescents. *Journal of Paediatrics and Child Health, 49*(11), 942–949. doi: 10.1111/jpc.12442

Lara, M., Gamboa, C., Kahramanian, M. I., Morales, L. S., & Bautista, D.E.H. (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health, 26*(1), 367–397. doi: 10.1146/annurev.publhealth.26.021304.144615

Layne, C. S., Parker, N. H., Soltero, E. G., Chavez, J. R., O'Connor, D. P., Gallagher, M. R., & Lee, R. E. (2015). Are physical activity studies in Hispanics meeting reporting guidelines for continuous monitoring technology? A systematic review. *BMC Public Health, 15*(1), 917. doi: 10.1186/s12889-015-2266-4

LeCuyer, E. A., & Zhang, Y. (2015). An integrative review of ethnic and cultural variation in socialization and children's self-regulation. *Journal of Advanced Nursing, 71*(4), 735–750. doi:10.1111/jan.12526

Lee, B., Scholar, P., & Porfeli, E. (2015). Youths' socialization to work and school within the family. *International Journal for Educational and Vocational Guidance, 15*(2), 145–162. doi:10.1007/s10775-015-9302-x

Lee, S. H., & Im, E. O. (2010). Ethnic differences in exercise and leisure time physical activity among midlife women. *Journal of Advanced Nursing, 66*(4), 814–827. doi: 10.1111/j.1365-2648.2009.05242.x

Lee, S. M., Burgeson, C. R., Fulton, J. E., & Spain, C. G. (2007). Physical education and physical activity: Results from the school health policies and programs study 2006. *Journal of School Health, 77*(8), 435–463. doi: 10.1111/j.1746-1561.2007.00229.x

Lee, S. M., Daniels, M. H., & Kissinger, D. B. (2006). Parental influences on adolescent adjustment: Parenting styles versus parenting practices. *The Family Journal, 14*(3), 253–259. doi:10.1177/1066480706287654

Leek, D., Carlson, J. A., Cain, K. L., Henrichon, S., Rosenberg, D., Patrick, K., & Sallis, J. F. (2011). Physical activity during youth sports practices. *Archives of Pediatrics & Adolescent Medicine, 165*(4), 294–299. doi:10.1001/archpediatrics.2010.252

Lerner, R. M., & Galambos, N. L. (1998). Adolescent development: Challenges and opportunities for research, programs, and policies. *Annual Review of Psychology, 49*, 413.

Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., … von Eye, A. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade

adolescents: Findings from the first wave of the 4-H Study of Positive Youth Development. *The Journal of Early Adolescence, 25*(1), 17–71. doi: 10.1177/0272431604272461

Li, S., Treuth, M. S., & Wang, Y. (2010). How active are American adolescents and have they become less active? *Obesity Reviews, 11*(12), 847–862. doi: 10.1111/j.1467-789X.2009.00685.x

Li, T. Y., Rana, J. S., Manson, J. E., Willett, W. C., Stampfer, M. J., Colditz, G. A., … Hu, F. B. (2006). Obesity as compared with physical activity in predicting risk of coronary heart disease in women. *Circulation, 113*(4), 499–506. doi: 10.1161/CIRCULATIONAHA.105.574087

Litt, I. F. (1998). Age limits of pediatrics, American Academy of Pediatrics, Council on Child Health, Pediatrics, 1972;49:463. *Pediatrics, 102*(1), 249–250. doi: 10.1542/peds.102.1.S1.249

Little, T. D., Preacher, K. J., Selig, J. P., & Card, N. A. (2007). New developments in latent variable panel analyses of longitudinal data. *International Journal of Behavioral Development, 31*(4), 357–365. doi: 10.1177/0165025407077757

Logan, J. R., & Turner, R. N. (2013). Hispanics in the United States: Not only Mexicans. US2010 Project., Retrieved from https://s4.ad.brown.edu/Projects/Diversity/Data/Report/report03202013.pdf

Loman, D. G. (2008). Promoting physical activity in teen girls: Insight from focus groups. *MCN, The American Journal of Maternal/Child Nursing, 33*(5), 294–299. doi:10.1097/01.NMC.0000334896.91720.86

Lorenzo-Blanco, E. I., Schwartz, S. J., Unger, J. B., Romero, A. J., Cano, M. Á., Baezconde-Garbanati, L., … Pattarroyo, M. (2016). A process-oriented analysis of parent acculturation, parent socio-cultural stress, family processes, and Latina/o youth smoking and depressive symptoms. *International Journal of Intercultural Relations, 52*, 60–71. doi:http://dx.doi.org/10.1016/j.ijintrel.2016.04.001

Lowery, S. E., Nicpon, M. F., Blanks, E. H., Befort, C., Kurpius, S. E. R., Sollenberger, S., & Huser, L. (2005). Body image, self-esteem, and health-related behaviors among male and female first year college students. *Journal of College Student Development, 46*(6), 612–623. doi:10.1353/csd.2005.0062

Lubans, D. R., Foster, C., & Biddle, S. J. H. (2008). A review of mediators of behavior in interventions to promote physical activity among children and adolescents. *Preventive Medicine, 47*(5), 463–470. doi: 10.1016/j.ypmed.2008.07.011

Ludwig, D. S. (2007). Childhood obesity: The shape of things to come. *The New England Journal of Medicine, 357*(23), 2325–2327. doi: 10.1056/NEJMp0706538

Luyckx, K., Teppers, E., Klimstra, T. A., & Rassart, J. (2014). Identity processes and personality traits and types in adolescence: Directionality of effects and developmental trajectories. *Developmental Psychology., 50*(8), 2144–2153.

Maccoby, E. E. (1992). The role of parents in the socialization of children: An historical overview. *Developmental Psychology, 28*(6), 1006–1017. doi:10.1037/0012-1649.28.6.1006

Manson, J. E., Skerrett, P. J., Greenland, P., & VanItallie, T. B. (2004). The escalating pandemics of obesity and sedentary lifestyle: A call to action for clinicians. *Archives of Internal Medicine, 164*(3), 249–258.

Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11*(3), 320–341. doi: 10.1207/s15328007sem1103_2

Marsiglia, F. F., Nagoshi, J. L., Parsai, M., Booth, J. M., & Castro, F. G. (2014). The parent–child acculturation gap, parental monitoring, and substance use in Mexican heritage adolescents in Mexican neighborhoods of the Southwest U.S. *Journal of Community Psychology, 42*(5), 530–543. doi:10.1002/jcop.21635

Martinez, C. R., McClure, H. H., & Eddy, J. M. (2009). Language brokering contexts and behavioral and emotional adjustment among Latino parents and adolescents. *The Journal of Early Adolescence, 29*(1), 71–98. doi: 10.1177/0272431608324477

Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53*(2), 205–220. doi: 10.1037/0003-066X.53.2.205

Maturo, C. C., & Cunningham, S. A. (2013). Influence of friends on children's physical activity: A review. *American Journal of Public Health, 103*(7), e23.

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology, 60*(1), 577–605. doi: 10.1146/annurev.psych.60.110707.163612

McArdle, J. J., & Hamagami, F. (1992). Modeling incomplete longitudinal and cross-sectional data using latent growth structural models. *Experimental Aging Research, 18*(3), 145–166.

McClure, A. C., Tanski, S. E., Kingsbury, J., Gerrard, M., & Sargent, J. D. (2010). Characteristics associated with low self-esteem among US adolescents. *Academic Pediatrics, 10*(4), 238–244.e232. doi:http://dx.doi.org/10.1016/j.acap.2010.03.007

McNeely, C., & Falci, C. (2004). School connectedness and the transition into and out of health-risk behavior among adolescents: A comparison of social belonging and teacher support. *Journal of School Health, 74*(7), 284–292. doi:10.1111/j.1746-1561.2004.tb08285.x

McNeil, J., & Helwig, C. C. (2015). Balancing social responsibility and personal autonomy: Adolescents' reasoning about community service programs. *Journal of Genetic Psychology, 176*(6), 349–368. doi:10.1080/00221325.2015.1077189

McQuitty, S. (2004). Statistical power and structural equation models in business research. *Journal of Business Research, 57*(2), 175–183. doi: 10.1016/S0148-2963(01)00301-0

Merianos, A. L., King, K. A., Vidourek, R. A., & Nabors, L. A. (2015). Recent alcohol use and binge drinking based on authoritative parenting among Hispanic youth nationwide. *Journal of Child and Family Studies, 24*(7), 1966–1976. doi:10.1007/s10826-014-9996-2

Mogro-Wilson, C. (2008). The influence of parental warmth and control on Latino adolescent alcohol use. *Hispanic Journal of Behavioral Sciences, 30*(1), 89–105. doi:10.1177/0739986307310881

Mohamadian, H., Eftekhar, H., Rahimi, A., Mohamad, H. T., Shojaiezade, D., & Montazeri, A. (2011). Predicting health-related quality of life by using a health promotion model among Iranian adolescent girls: A structural equation modeling approach. *Nursing & Health Sciences, 13*(2), 141-148. doi: 10.1111/j.1442-2018.2011.00591.x

Monahan, K. C., Oesterle, S., & Hawkins, J. D. (2010). Predictors and consequences of school connectedness: The case for prevention. *The Prevention Researcher, 17*(3), 3.

Morales-Chicas, J., & Graham, S. (2015). Pubertal timing of Latinas and school connectedness during the transition to middle school. *Journal of Youth and Adolescence, 44*(6), 1275–1287. doi: 10.1007/s10964-014-0192-x

Moshman, D. (2005). *Adolescent psychological development: Rationality, morality, and identity* (2nd ed.). Mahwah, NJ: Psychology Press.

Murphey, D., Guzman, L., & Torres, A. (2014). *America's Hispanic children: Gaining ground, looking forward* (Vol. 38). Bethesda, MD: Child Trends.

National Alliance for Hispanic Health. (2010). The state of diabetes among Hispanics: Executive summary. Washington, DC.

National Center for Education Statistics. (2009). Digest of education statistics, Table 42: Number and percentage of public school students eligible for free or reduced-

price lunch, by state: 2000–01, 2005–06, 2006–07, and 2007–08. Retrieved May 23, 2017, from https://nces.ed.gov/programs/digest/d09/tables/dt09_042.asp

National Healthy Marriage Resource Center. (2017). Marriage in the Hispanic and Latino community. Retrieved May 10, 2017, from http://www.healthymarriageinfo.org/research-and-policy/marriage-facts/culture/hispanics-and-latinos/index.aspx

Netemeyer, R. G., Bearden, W. O., & Sharma, S. (2003). *Scaling procedures: Issues and applications*. Thousand Oaks, CA: Sage Publications.

Neumark-Sztainer, D., Story, M., Hanna, P. J., Tharp, T., & Rex, J. (2003). Factors associated with changes in physical activity: A cohort study of inactive adolescent girls. *Archives of Pediatrics and Adolescent Medicine,, 157*(8), 803–810.

Newman, K., Vance, D., & Moneyham, L. (2010). Interpreting evidence from structural equation modeling in nursing practice. *Journal of Research in Nursing, 15*(3), 275–284. doi: doi:10.1177/1744987109346666

Nunnally, J. C. (1978). *Psychometric theory* (Vol. 2nd). New York: McGraw-Hill.

Noller, P., & Bagi, S. (1985). Parent-adolescent communication. *Journal of Adolescence, 8*(2), 125–144. doi: http://dx.doi.org/10.1016/S0140-1971(85)80042-7

Nurmi, J.-E. (1993). Adolescent development in an age-graded context: The role of personal beliefs, goals, and strategies in the tackling of developmental tasks and standards. *International Journal of Behavioral Development, 16*(2), 169–189.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999–2010.

The Journal of the American Medical Association, , 307(5), 483–490. doi: 10.1001/jama.2012.40

O'Hare, W. P. (2009). The forgotten fifth: Child poverty in rural America. Durham, NH: University of New Hampshire.

Ornelas, I. J., Perreira, K. M., & Ayala, G. X. (2007). Parental influences on adolescent physical activity: A longitudinal study. *International Journal of Behavioral Nutrition and Physical Activity, 4*(1), 1–10. doi: 10.1186/1479-5868-4-3

Özdemir, A., Utkualp, N., & Pallos, A. (2016). Physical and psychosocial effects of the changes in adolescence period. *International Journal of Caring Sciences, 9*(2), 717–723.

Parke, R. D., Coltrane, S., Duffy, S., Buriel, R., Dennis, J., Powers, J., … Widaman, K. F. (2004). Economic stress, parenting, and child adjustment in Mexican American and European American families. *Child Development, 75*(6), 1632–1656. doi:10.1111/j.1467-8624.2004.00807.x

Pender, N. J. (2011). The health promotion model manual. 6th ed. Retrieved from http://hdl.handle.net/2027.42/85350

Pender, N. J., Parsons, M. A., & Murdaugh, C. L. (2006). *Health promotion in nursing practice*. Upper Saddle River, NJ: Prentice Hall.

Perez-Brena, N. J., Updegraff, K. A., & Umaña-Taylor, A. J. (2015). Transmission of cultural values among Mexican-origin parents and their adolescent and emerging adult offspring. *Family Process, 54*(2), 232–246. doi:10.1111/famp.12114

Pettee Gabriel, K. K., Morrow, J. J. R., & Woolsey, A.-L. T. (2012). Framework for physical activity as a complex and multidimensional behavior. *Journal of Physical Activity and Health, 9 Suppl 1*, S11.

Philippe, F. L., Lecours, S., & Beaulieu-Pelletier, G. (2009). Resilience and positive emotions: Examining the role of emotional memories. *Journal of Personality, 77*(1), 139–176. doi:10.1111/j.1467-6494.2008.00541.x

Phinney, J. S. (1990). Ethnic identity in adolescents and adults: Review of research. *Psychological Bulletin, 108*(3), 499–514.

Phinney, J. S. (1992). The Multigroup Ethnic Identity Measure: A new scale for use with diverse groups. *Journal of Adolescent Research, 7*(2), 156–176. doi:10.1177/074355489272003

Phinney, J. S. (1996). When we talk about American ethnic groups, what do we mean? *American Psychologist, 51*(9), 918–927. doi: 10.1037//0003-066X.51.9.918

Phinney, J. S., Cantu, C. L., & Kurtz, D. A. (1997). Ethnic and American identity as predictors of self-esteem among African American, Latino, and White adolescents. *Journal of Youth and Adolescence, 26*(2), 165–185. doi: 10.1023/a:1024500514834

Piercy, K. L., Troiano, R. P., Lavizzo-Mourey, R., Dorn, J. M., Fulton, J. E., Janz, K. F., … Young, D. R. (2015). Opportunities for public health to increase physical activity among youths. *American Journal of Public Health,, 105*(3), 421–426. doi: 10.2105/AJPH.2014.302325

Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice*. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.

Ponterotto, J. G., Gretchen, D., Utsey, S. O., Stracuzzi, T., & Saya, R. (2003). The Multigroup Ethnic Identity Measure (MEIM): Psychometric review and further validity testing. *Educational and Psychological Measurement, 63*(3), 502–515. doi: 10.1177/0013164403063003010

Preacher, K. J., & Coffman, D. L. (2006, May). Computing power and minimum sample size for RMSEA [Computer software]. Retrieved from http://quantpsy.org/.

Prinzie, P., & Onghena, P. (2005). Cohort sequential design. *Encyclopedia of Statistics in Behavioral Science.* John Wiley & Sons, Ltd.

ProximityOne. (2017, February 19). Texas school district demographic profiles. Retrieved from http://www.proximityone.com/tx_sdc.htm

Quick, V., Nansel, T. R., Liu, D., Lipsky, L. M., Due, P., & Iannotti, R. J. (2014). Body size perception and weight control in youth: 9-year international trends from 24 countries. *International Journal of Obesity (2005), 38*(7), 988. doi: 10.1038/ijo.2014.62

Quintana, S. M., Aboud, F. E., Chao, R. K., Contreras-Grau, J., Cross, W. E., Hudley, C., … Vietze, D. L. (2006). Race, ethnicity, and culture in child development: Contemporary research and future directions. *Child Development, 77*(5), 1129–1141. doi: 10.1111/j.1467-8624.2006.00951.x

Rand, C. S. W., & Wright, B. A. (2001). Thinner females and heavier males: Who says? A comparison of female to male ideal body sizes across a wide age span. *International Journal of Eating Disorders, 29*(1), 45–50. doi: 10.1002/1098-108X(200101)29:1<45::AID-EAT7>3.0.CO;2-I

Resnick, M. D., Harris, L. J., & Blum, R. W. (1993). The impact of caring and connectedness on adolescent health and well-being. *Journal of Paediatrics and Child Health., 29*, S3–S9. doi:10.1111/j.1440-1754.1993.tb02257.x

Rew, L. (2005). *Adolescent health: A multidisciplinary approach to theory, research, and intervention*. Thousand Oaks, CA: Sage Publications, Inc.

Rew, L., Arheart, K. L., Horner, S. D., Thompson, S., & Johnson, K. E. (2015). Gender and ethnic differences in health-promoting behaviors of rural adolescents. *The Journal of School Nursing, 31*(3), 219–232.

Rew, L., Arheart, K. L., Johnson, K., & Spoden, M. (2015). Changes in ethnic identity and competence in middle adolescents. *Journal of Transcultural Nursing 26*(3), 227–233. doi: 10.1177/1043659614524250

Rew, L., Arheart, K. L., Thompson, S., & Johnson, K. (2013). Predictors of adolescents' health-promoting behaviors guided by primary socialization theory. *Journal for Specialists in Pediatric Nursing, 18*(4), 277–288. doi: 10.1111/jspn.12036

Rew, L., Grady, M. W., & Spoden, M. (2012). Childhood predictors of adolescent competence and self-worth in rural youth. *Journal of Child and Adolescent Psychiatric Nursing, 25*(4), 169–177. doi: 10.1111/jcap.12013

Rew, L., Horner, S. D., & Brown, A. (2011). Health-risk behaviors in early adolescence. *Issues in Comprehensive Pediatric Nursing., 34*(2), 79–96. doi:10.3109/01460862.2011.574452

Rew, L., Horner, S. D., & Fouladi, R. T. (2010). Factors associated with health behaviors in middle childhood. *Journal of Pediatric Nursing, 25*(3), 157–166. doi: 10.1016/j.pedn.2008.10.006

Rey-Lopez, J. P., Vicente-Rodríguez, G., Biosca, M., & Moreno, L. A. (2008). Sedentary behaviour and obesity development in children and adolescents. *Nutrition, Metabolism & Cardiovascular Diseases, 18*(3), 242–251.

Richardson, J. T. E. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review, 6*(2), 135–147. doi: 10.1016/j.edurev.2010.12.001

Riedl, D. F., Kaufmann, L., & Gaeckler, J. (2014). Statistical power of structural equation models in SCM research. *Journal of Purchasing and Supply Management, 20*(3), 208. doi: 10.1016/j.pursup.2014.05.004

Ries, A. V., Voorhees, C. C., & Gittelsohn, J. (2010). Environmental barriers and facilitators of physical activity among urban African-American youth. *Children, Youth and Environments, 20*(1), 26–51. doi: 10.7721/chilyoutenvi.20.1.0026

Rivas-Drake, D., Seaton, E. K., Markstrom, C., Quintana, S., Syed, M., Lee, R. M., … Racial Identity in the 21st Century Study Group. (2014). Ethnic and racial identity in adolescence: Implications for psychosocial, academic, and health outcomes. *Child Development, 85*(1), 40–57. doi: 10.1111/cdev.12200

Rivera, F., García-Moya, I., Moreno, C., & Ramos, P. (2013). Developmental contexts and sense of coherence in adolescence: A systematic review. *Journal of Health Psychology, 18*(6), 800–812.

Roberts, R. E., Phinney, J. S., Masse, L. C., Chen, Y. R., Roberts, C. R., & Romero, A. (1999). The structure of ethnic identity of young adolescents from diverse ethnocultural groups. *The Journal of Early Adolescence, 19*(3), 301–322. doi: 10.1177/0272431699019003001

Roche, K. M., Ensminger, M. E., & Cherlin, A. J. (2007). Variations in parenting and adolescent outcomes among African American and Latino Families living in low-income, urban areas. *Journal of Family Issues, 28*(7), 882–909. doi:10.1177/0192513X07299617

Rodríguez, S. A., Perez-Brena, N. J., Updegraff, K. A., & Umaña-Taylor, A. J. (2014). Emotional closeness in Mexican-origin adolescents' relationships with mothers, fathers, and same-sex friends. *Journal of Youth and Adolescence, 43*(12), 1953–1968. doi:10.1007/s10964-013-0004-8

Rosen, D. S. (2004). Physiologic growth and development during adolescence. *Pediatrics in Review, 25*(6), 194–199.

Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association, 91*(434), 473–489.

Rusby, J. C., Westling, E., Crowley, R., & Light, J. M. (2014). Psychosocial correlates of physical and sedentary activities of early adolescent youth. *Health Education & Behavior, 41*(1), 42–51. doi: 10.1177/1090198113485753

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *The American Journal of Orthopsychiatry, 57*(3), 316–331. doi:10.1111/j.1939-0025.1987.tb03541.x

Sacks, V., Moore, K. A., Shaw, A., & Cooper, P. M. (2014, November). The family environment and adolescent well-being. *Child Trends Research Brief (Publication No. 2014-52).* Retrieved from http://www.childtrends.org/wp-content/uploads/2014/11/2014-52FamilyEnvironmentRB.pdf

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise, 32*(5), 963–975.

Sandlin, J. R., & Keathley, R. S. (2014). Positive youth development through sport: Best practices for successful outcomes. *Research Quarterly for Exercise and Sport, 85*(S1), 122–123.

Santisteban, D. A., Coatsworth, J. D., Briones, E., Kurtines, W., & Szapocznik, J. (2012). Beyond acculturation: An investigation of the relationship of familism and parenting to behavior problems in Hispanic youth. *Family Process, 51*(4), 470–482. doi: 10.1111/j.1545-5300.2012.01414.x

Saphir, M. N., & Chaffee, S. H. (2002). Adolescents' contributions to family communication patterns. *Human Communication Research, 28*(1), 86–108. doi: 10.1093/hcr/28.1.86

Sarkar, J., & Sarkar, D. (2016). Why does child labor persist with declining poverty?: Inequality and child labor. *Economic Inquiry, 54*(1), 139–158. doi:10.1111/ecin.12234

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*(2), 147–177. doi: 10.1037//1082-989X.7.2.147

Schaie, K. W., & Baltes, P. B. (1975). On sequential strategies in developmental research. *Human Development, 18*(5), 384–390.

Schmidt, M., Blum, M., Valkanover, S., & Conzelmann, A. (2015). Motor ability and self-esteem: The mediating role of physical self-concept and perceived social acceptance. *Psychology of Sport and Exercise, 17*, 15–23. doi: http://dx.doi.org/10.1016/j.psychsport.2014.11.006

Schmitz, M. F. (2006). Influence of social and family contexts on self-esteem of Latino youth. *Hispanic Journal of Behavioral Sciences, 28*(4), 516–530. doi: 10.1177/0739986306293999

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–337. doi: 10.2307/27548147

Schwartz, S. J., Zamboanga, B. L., & Jarvis, L. H. (2007). Ethnic identity and acculturation in Hispanic early adolescents: Mediated relationships to academic grades, prosocial behaviors, and externalizing symptoms. *Cultural Diversity and Ethnic Minority Psychology, 13*(4), 364–373. doi: 10.1037/1099-9809.13.4.364

Sebastian, C., Burnett, S., & Blakemore, S.-J. (2008). Development of the self-concept during adolescence. *Trends in Cognitive Sciences, 12*(11), 441–446. doi:10.1016/j.tics.2008.07.008

Sharp, E. H., Caldwell, L. L., Graham, J. W., & Ridenour, T. A. (2006). Individual motivation and parental influence on adolescents' experiences of interest in free time: A longitudinal examination. *Journal of Youth and Adolescence, 35*(3), 340–353. doi:10.1007/s10964-006-9045-6

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research, 46*(3), 407–441. doi:10.2307/1170010

Shaw, S. R., Gomes, P., Polotskaia, A., & Jankowska, A. M. (2015). The relationship between student health and academic performance: Implications for school psychologists. *School Psychology International, 36*(2), 115–134.

Shi, Q., Steen, S., & Weiss, B. A. (2013). The impact of parental support and perception of school on Hispanic youth's substance use. *The Family Journal, 21*(4), 425. doi:10.1177/1066480713490891

Shi, X., Tubb, L., Fingers, S. T., Chen, S., & Caffrey, J. L. (2013). Associations of physical activity and dietary behaviors with children's health and academic problems. *Journal of School Health, 83*(1), 1–7. doi: 10.1111/j.1746-1561.2012.00740.x

Shin, A., & Nam, C. M. (2015). Weight perception and its association with socio-demographic and health-related factors among Korean adolescents. *BMC Public Health 15*(1), 1292. doi: 10.1186/s12889-015-2624-2

Sisson, S. B., & Katzmarzyk, P. T. (2008). International prevalence of physical activity in youth and adults. *Obesity Reviews, 9*(6), 606–614. doi:10.1111/j.1467-789X.2008.00506.x

Smith, A. K., Ayanian, J. Z., Covinsky, K. E., Landon, B. E., McCarthy, E. P., Wee, C. C., & Steinman, M. A. (2011). Conducting high-value secondary dataset analysis: An introductory guide and resources. *Journal of General Internal Medicine, 26*(8), 920–929. doi: 10.1007/s11606-010-1621-5

Sonstroem, R. J., Speliotis, E. D., & Fava, J. L. (1992). Perceived physical competence in adults: An examination of the physical self-perception profile. *Journal of Sport & Exercise Psychology, 14*(2), 207.

Spence, J. C., & Lee, R. E. (2003). Toward a comprehensive model of physical activity. *Psychology of Sport & Exercise, 4*(1), 7–24. doi:10.1016/S1469-0292(02)00014-6

Spencer, R. A., Rehman, L., & Kirk, S.F.L. (2015). Understanding gender norms, nutrition, and physical activity in adolescent girls: A scoping review. *The International Journal of Behavioral Nutrition and Physical Activity, 12*(1), 6. doi:10.1186/s12966-015-0166-8

Srof, B. J., & Velsor-Friedrich, B. (2006). Health promotion in adolescents: A review of Pender's Health Promotion Model. *Nursing Science Quarterly, 19*(4), 366–373. doi: 10.1177/0894318406292831

Stein, C., Fisher, L., Berkey, C., & Colditz, G. (2007). Adolescent physical activity and perceived competence: Does change in activity level impact self-perception? *Journal of Adolescent Health, 40*(5), 462. e461–462. e468.

Steinberg, L. (2001). We know some things: Parent–adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence, 11*(1), 1–19.

Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences, 9*(2), 69–74. doi: 10.1016/j.tics.2004.12.005

Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology, 52*(1), 83–110.

Sterdt, E., Liersch, S., & Walter, U. (2014). Correlates of physical activity of children and adolescents: A systematic review of reviews. *Health Education Journal, 73*(1), 72–89. doi: 10.1177/0017896912469578

Sternfeld, B., Ainsworth, B. E., & Quesenberry Jr., C. P. (1999). Physical activity patterns in a diverse population of women. *Preventive Medicine 28*(3), 313–323. doi: http://dx.doi.org/10.1006/pmed.1998.0470

Stevens, J. P. (2012). *Intermediate Statistics: A Modern Approach, Third Edition* (Vol. 3rd). Hoboken: Taylor and Francis.

Stocchi, V., De Feo, P., & Hood, D. A. (2007). *The role of physical exercise in preventing disease and improving the quality of life*. New York, Milan: Springer.

Sunday, S., Labruna, V., Kaplan, S., Pelcovitz, D., Newman, J., & Salzinger, S. (2008). Physical abuse during adolescence: Gender differences in the adolescents'

perceptions of family functioning and parenting. *Child Abuse & Neglect, 32*(1), 5–18. doi:10.1016/j.chiabu.2007.03.025

Taymoori, P., Lubans, D., & Berry, T. R. (2010). Evaluation of the Health Promotion Model to predict physical activity in Iranian adolescent boys. *Health Education & Behavior, 37*(1), 84-96. doi: 10.1177/1090198109356407

Telford, R. D. (2007). Low physical activity and obesity: Causes of chronic disease or simply predictors? *Medicine & Science in Sports & Exercise, 39*(8), 1233–1240. doi: 10.1249/mss.0b013e31806215b7

Thoma, B. C., & Huebner, D. M. (2014). Parental monitoring, parent–adolescent communication about sex, and sexual risk among young men who have sex with men. *AIDS and Behavior, 18*(8), 1604–1614. doi:10.1007/s10461-014-0717-z

Timo, J., Sami, Y. P., Anthony, W., & Jarmo, L. (2016). Perceived physical competence towards physical activity, and motivation and enjoyment in physical education as longitudinal predictors of adolescents' self-reported physical activity. *Journal of Science and Medicine in Sport, 19*(9), 750–754. doi:10.1016/j.jsams.2015.11.003

Trinh, L., Wong, B., & Faulkner, G. E. (2015). The independent and interactive associations of screen time and physical activity on mental health, school connectedness and academic achievement among a population-based sample of youth. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 24*(1), 17.

Troiano, R. P., Pettee Gabriel, K. K., Welk, G. J., Owen, N., & Sternfeld, B. (2012). Reported physical activity and sedentary behavior: Why do you ask? *Journal of Physical Activity and Health, , 9 Suppl 1*, S68–S75.

Trust for America's Health Reports. (2012). F as in fat: How obesity threatens America's future 2012, September. http://healthyamericans.org/report/100/

U.S. Census Bureau. (2010, January 27). American fact finder: Population, housing units, area, and density: State (in seleced states) and county subdivision summary file 1 for years 2000 and 2010. Retrieved from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

U.S. Census Bureau. (2015, February 9). 2010 Census Urban Area FAQ: Urban and rural definition. Retrieved from https://www.census.gov/geo/reference/ua/uafaq.html

U.S. Department of Education. (2015). The community eligibility provision and selected requirements under Title I, Part A of the Elementary and Secondary Education Act of 1965, as amended.

U.S. Department of Health and Human Services. (2008). 2008 Physical Activity Guidelines for all Americans. Retrieved September 20, 2016, from http://www.health.gov/paguidelines/guidelines

U.S. Department of Health and Human Services. (2016, March 28). 2020 topics and objectives: Physical activity. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/physical-activity/national-snapshot

Umaña-Taylor, A. J. (2004). Ethnic identity and self-esteem: Examining the role of social context. *Journal of Adolescence, 27*(2), 139–146. doi: 10.1016/j.adolescence.2003.11.006

Umaña-Taylor, A. J. (2009). Research with Latino early adolescents: Strengths, challenges, and directions for future research. *The Journal of Early Adolescence, 29*(1), 5–15. doi:10.1177/0272431608324481

Umaña-Taylor, A. J., O'Donnell, M., Knight, G. P., Roosa, M. W., Berkel, C., & Nair, R. (2014). Mexican-origin early adolescents' ethnic socialization, ethnic identity, and psychosocial functioning. *The Counseling Psychologist, 42*(2), 170–200. doi: 10.1177/0011000013477903

Umaña-Taylor, A. J., & Updegraff, K. A. (2007). Latino adolescents' mental health: Exploring the interrelations among discrimination, ethnic identity, cultural orientation, self-esteem, and depressive symptoms. *Journal of Adolescence, 30*(4), 549–567. doi: http://dx.doi.org/10.1016/j.adolescence.2006.08.002

Unger, J. B., Ritt-Olson, A., Wagner, K. D., Soto, D. W., & Baezconde-Garbanati, L. (2009). Parent-child acculturation patterns and substance use among Hispanic adolescents: A longitudinal analysis. *The Journal of Primary Prevention, 30*(3–4), 293–313. doi:10.1007/s10935-009-0178-8

Van Der Horst, K., Paw, M.J.C.A., Twisk, J.W.R., & Van Mechelen, W. (2007). A brief review on correlates of physical activity and sedentariness in youth. *Medicine and Science in Sports and Exercise, 39*(8), 1241–1250. doi: 10.1249/mss.0b013e318059bf35

Vásquez, E., Shaw, B. A., Gensburg, L., Okorodudu, D., & Corsino, L. (2013). Racial and ethnic differences in physical activity and bone density: National Health and Nutrition Examination Survey, 2007–2008. *Preventing Chronic Disease 10*, E216.

Wagner, K. D., Ritt-Olson, A., Soto, D. W., Rodriguez, Y. L., Baezconde-Garbanati, L., & Unger, J. B. (2008). The role of acculturation, parenting, and family in Hispanic/Latino adolescent substance use: Findings from a qualitative analysis. *Journal of Ethnicity in Substance Abuse, 7*(3), 304–327. doi: 10.1080/15332640802313320

Wang, J., & Wang, X. (2012). *Structural equation modeling: Applications using Mplus*. Chichester, West Sussex, U.K.: John Wiley & Sons, Ltd.

Wen, M., & Su, D. (2015). Correlates of leisure-time physical activity participation among Latino children and adolescents with acanthosis nigricans. *Journal of Immigrant and Minority Health, 17*(5), 1330–1336. doi: 10.1007/s10903-014-9977-y

Wheeler, L. A., Updegraff, K. A., & Crouter, A. (2015). Mexican-origin parents' work conditions and adolescents' adjustment. *Journal of Family Psychology 29*(3), 447–457. doi:10.1037/fam0000085

Whitcomb, S. A., & Merrell, K. W. (2012). *Behavioral, social, and emotional assessment of children and adolescents* (Vol. 4). New York: Routledge.

Whitt-Glover, M. C., Taylor, W. C., Floyd, M. F., Yore, M. M., Yancey, A. K., & Matthews, C. E. (2009). Disparities in physical activity and sedentary behaviors

among US children and adolescents: Prevalence, correlates, and intervention implications. *Journal of Public Health Policy, 30*(S1), S309–S334. doi: 10.1057/jphp.2008.46

Wichstrøm, L. (1995). Harter's Self-Perception Profile for Adolescents: Reliability, validity, and evaluation of the question format. *Journal of Personality Assessment, 65*(1), 100–116. doi: 10.1207/s15327752jpa6501_8

Wiley, A. R., Flood, T. L., Andrade, F.C.D., Aradillas, C., & Cerda, E. M. (2011). Family and individual predictors of physical activity for older Mexican adolescents. *Journal of Adolescent Health, 49*(2), 222–224. doi:http://dx.doi.org/10.1016/j.jadohealth.2010.11.258

Wilkinson-Lee, A. M., Zhang, Q., Nuno, V. L., & Wilhelm, M. S. (2011). Adolescent emotional distress: The role of family obligations and school connectedness. *Journal of Youth and Adolescence, 40*(2), 221–230. doi:10.1007/s10964-009-9494-9

Williams, A., Wold, J., Dunkin, J., Idleman, L., & Jackson, C. (2004). CVD prevention strategies with urban and rural African American women. *Applied Nursing Research, 17*(3), 187–194. doi: 10.1016/j.apnr.2004.06.003

Williams, J. L., Aiyer, S. M., Durkee, M. I., & Tolan, P. H. (2014). The protective role of ethnic identity for urban adolescent males facing multiple stressors. *Journal of Youth and Adolescence, 43*(10), 1728–1741. doi:10.1007/s10964-013-0071-x

Wong, W. W., Mikhail, C., Ortiz, C. L., Lathan, D., Moore, L. A., Konzelmann, K. L., & Smith, E.O.B. (2014). Body weight has no impact on self-esteem of minority

children living in inner city, low-income neighborhoods: A cross-sectional study. *BMC Pediatrics, 14*(1), 14–19. doi:10.1186/1471-2431-14-19

World Health Organization. (2016). Adolescents: Health risks and solutions. Retrieved April 24, 2016, from http://www.who.int/mediacentre/factsheets/fs345/en/

Worrell, F. C. (1997). An exploratory factor analysis of Harter's Self-Perception Profile for adolescents with academically talented students. *Educational and Psychological Measurement, 57*(6), 1016–1024. doi: 10.1177/0013164497057006010

Wright, K. N. (2011). Influence of BMI, gender, and Hispanic ethnicity on physical activity in urban children. *Journal for Specialists in Pediatric Nursing, 16*(2), 90–104. doi: 10.1111/j.1744-6155.2010.00263.x

Yang, F., Tan, K.-A., & Cheng, W. J. Y. (2014). The effects of connectedness on health-promoting and health-compromising behaviors in adolescents: Evidence from a statewide survey. *The Journal of Primary Prevention, 35*(1), 33–46. doi: 10.1007/s10935-013-0327-y

Ybrandt, H. (2008). The relation between self-concept and social functioning in adolescence. *Journal of Adolescence, 31*(1), 1–16.

Yomtov, D., Plunkett, S. W., Sands, T., & Reid, A. (2015). Parenting and ninth graders' self-efficacy and relational self-esteem in Latino immigrant families. *Family and Consumer Sciences Research Journal, 43*(3), 269–283. doi:10.1111/fcsr.12102

Young, M. D., Plotnikoff, R. C., Collins, C. E., Callister, R., & Morgan, P. J. (2014). Social cognitive theory and physical activity: A systematic review and meta-analysis. *Obesity Reviews, 15*(12), 983–995. doi: 10.1111/obr.12225

Yurgelun-Todd, D. (2007). Emotional and cognitive changes during adolescence. *Current Opinion in Neurobiology, 17*(2), 251–257. doi: 10.1016/j.conb.2007.03.009

Zhu, W., Welk, G. J., Meredith, M. D., & Boiarskaia, E. A. (2010). A survey of physical education programs and policies in Texas schools. *Research Quarterly for Exercise and Sport, 81*(3 Suppl), S42–S52. doi: 10.1080/02701367.2010.10599693

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